BUREAU OF HYGIENE AND TROPICAL DISEASES.

TROPICAL DISEASES BULLETIN.

Vol. 25.] 1928. [No. 7.

UNDULANT AND ABORTUS FEVERS.

HARDY (A. V.). **Malta Fever: a Problem for State and Municipal Laboratories.**—*Public Health Rep.* 1928. Mar. 2. Vol. 43. No. 9. pp. 503–511. [8 refs.]

This paper is a plea for the larger use of the State laboratories in the diagnosis of undulant fever and, indeed, fevers in general. The author quotes EVANS as saying "there is no disease in which the physician is more dependent upon laboratory findings for a correct diagnosis than in undulant fever."

The author is of opinion that many cases of the disease have so far escaped notice by reason of the neglect of laboratory investigations. He clearly proves this by showing that when bloods sent for Widal test, i.e., for typhoid group, were also tested against *Br. melitensis*, 68 gave a positive reaction; but some of these were repeat examinations, and the total of actual cases of undulant fever detected by this means was 31 in six months. These 31 cases were all typical clinically. Whether *Br. abortus* or *Br. melitensis* was used the titre of agglutination of these organisms was practically the same. A titre of 1/1280 was obtained in some cases and any below 1/40 were regarded as negative and doubtful unless giving agglutination in titres higher than 1/80.

As the author points out, in public health laboratories dealing with large districts and with small staffs, simple and rapid methods must be employed. He uses a stock antigen of *Br. abortus* which he dilutes to an opacity equivalent to 500 million bacteria per cc., and the serum is diluted direct into the emulsion, dilutions up to 1/80 being employed; and if this is positive further dilutions are made with serum inactivated at 56° C. for thirty minutes.

Many of the specimens sent to this laboratory were dried blood specimens and a microscopic eliminating test was carried out on these. It has been found that if the blood be diluted with saline until the colour of a loop compares with that of pale vaseline, this will approximate to a dilution of 1/40. Although this is admittedly a rough method, a careful worker can at least separate positive from negative and by eliminating the latter reduce greatly the number of sera to be tested further.

For the further titration a colour comparison method (that of Wandsworth), in which standard colour dilutions of sheeps' blood are used, is employed.

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The author does not care to report positive results on this dried blood method alone, but if definite positive reactions are obtained a request for a wet blood specimen is sent and this is used for the macroscopic test.

Judging from the positive Widal reactions and positive findings with emulsions of *Br. abortus*, it would appear that undulant fever is just as common in Iowa State as is enteric fever.

The conclusion is that all sera sent to laboratories from cases of fever should, as a routine, be tested against *Br. melitensis*, whether a request is made for this examination or not.

D. Harvey.

British Medical Journal. 1927. Dec. 17. p. 1158.—**Undulant Fever. An Appeal for the Discontinuance of Geographical Designations.**

This is a memorandum from the Malta branch of the British Medical Association and the Camera Medica, Malta, appealing for the use of the designation " undulant fever " instead of " Malta " fever, and *brucei* instead of *melitensis* for the specific designation of the causal organism. The latter proposal, in view of the intention to hold an International Botanical Congress in 1930, is not discussed in the Memorandum.

D. H.

Watkins (W. Warner) & Lake (G. C.). **Malta Fever with Especial Reference to the Phoenix, Ariz. Epidemic of 1922.**—*Jl. Amer. Med. Assoc.* 1927. Nov. 5. Vol. 89. No. 19. pp. 1581–1584. [7 refs.]

The plea of the Medical Council of Malta, that "Malta fever" should no longer be designated by that name is certainly reinforced by the title of the paper summarized here. Malta fever in Phoenix, Ariz., is certainly a misnomer.

The paper opens with a historical account and a description of the clinical features of the disease. The authors point out that " undulant " fever may also be a misnomer, as the temperature may run a remittent or irregular intermittent course and not in waves. They consider that the mode of entrance is, as a rule, through the intestinal tract : but this is not the case in laboratory infection.

" Malta " fever was first recognized in the United States in 1905, in Texas. It was known as " slow fever," " Rio Grande fever " and " mountain fever." In 1912 it was recorded in Arizona, at Prescott, and was traced to consumption of goats' milk. In April, 1922, herds of goats were brought to Phoenix and a considerable amount of raw goats' milk was consumed. In May and June cases of fever of unknown origin were signalled and some cases were diagnosed by agglutination tests as Malta fever ; in August the use of goats' milk was discontinued.

Francis and Evans have pointed out that the sera of patients suffering from tularaemia may agglutinate *Brucella melitensis* and *abortus* cultures. If the agglutination titre for one of these organisms is much raised above the other two, this may be taken as diagnostic of infection by that disease, but if all three are of equal titre absorption tests are necessary.

Thirty-seven of the Phoenix cases gave a positive reaction with *melitensis*. The sera were not heated and *abortus* emulsions were not

used. Two cases were fatal. 18·3 per cent. of the sera of the herd of goats gave a positive reaction with *Br. melitensis*. All the cases showed a leucopenia and mononucleosis.

D. H.

PARTEARROYO (F. R.). La fièvre méditerranéenne en Espagne. [**Mediterranean Fever in Spain.**]—*Bull. Office Internat. d' Hyg. Publique.* 1927. Oct. Vol. 19. No. 10. pp. 1463–1465.

Undulant fever has long been known to occur in Spain. In 1814 it was recorded by BURNETT in Carthagena. The malady as a rule occurs in endemic fashion with occasional epidemic outbursts, especially in the summer along the Mediterranean littoral. Cases have also been recorded in such cities and towns as Madrid, Toledo, Segovia, Badajos and Zamora. In 1922 in the town of Alicante 123 cases were diagnosed by laboratory methods in three months with 15 deaths.

The infection is widespread among goats. In one investigation 60 per cent. of those examined gave a positive agglutination reaction ; and the infection in goats has a direct relation to the amount of the fever among the inhabitants of the districts.

Bacteriologically the *Br. melitensis* isolated in Spain does not differ in any important particular from strains isolated in other countries. Infections by *Br. abortus* have not so far been recorded in Spain, nor has *Br. paramelitensis* been met with.

The author does not agree that heating of sera to 56° C., as recommended by NÈGRE and RAYNAUD, is of much assistance in rendering agglutination more definite. NÈGRE and RAYNAUD believe that the group or non-specific agglutinins so frequently met with in this fever are due to a raised anti-tryptic power of the blood, which is removed by heating. But the author points out that such group or non-specific agglutinins are not met with in sera which are known to possess high anti-tryptic power, such as the sera of persons suffering from cancer, suppuration, etc. Also in the author's hands heating of the sera reduced the specific agglutinins as well as the non-specific. He has found the intracutaneous reaction of BURNET of use in diagnosis.

There is nothing remarkable about the clinical course of the disease in Spain. One of the most marked of the clinical signs noted was an enlargement of lymph glands. This was specially so in a case of laboratory infection.

Specific treatment consisted in the administration of anti-serum in a dose of 50 to 60 cc. every day while the temperature is raised, and, in addition, vaccine every third day in a dose of two million germs. Neosalvarsan was used in acute cases with success, 15 cgm. being given every second day.

D. H.

CÉSARI (E.). Prophylaxie de la fièvre méditerranéenne (diagnostic de l'infection mélitensique chez les animaux). [**Prophylaxis of Undulant Fever. Diagnosis of Melitensis Infection in Animals.**]—*Rev. Gén. de Méd. Vét.* 1928. Jan. 15. Vol. 37. No. 433. pp. 1–9. [3 refs.]

This paper refers to the undoubted spread of undulant fever in France and points out that from the animal point of view it is no longer a question only of goats, but sheep, cows and pigs must also be considered as possible infective agents.

The author refers to the regulation published in 1903, which gives public authorities the power to segregate infected animals and herds and to prohibit the sale of their milk. Working on this statute Césari considers that a great deal can be done to limit the spread of undulant fever. He points out, however, that infection with *melitensis*, unless it produces actual abortion, may give rise to no symptoms whatever in goats or sheep.

He cites two instances where cases of undulant fever had arisen and the source of infection (goats' milk) was definitely traced to small itinerant herds of goats. These animals appeared to be in perfect health, but by dint of carrying out agglutination reactions with the serum of all the goats and culturing samples of milk, he was able to show definite evidence of infection in two of these herds. These herds were isolated and the sale of their milk stopped.

By such a system of prophylaxis he suggests that a great deal could be done by veterinary officers to check the spread of the disease.

D. H.

Lourié (M.), Kossarew (N.) & Rosenblatt (A.). Observations sur la fièvre de Malte. [**Notes on Undulant Fever.**]—*Russian Jl. Trop. Med.* 1927. Vol. 5. No. 8. French summary p. 534. [In Russian pp. 473–480.] [Moustabekow Inst. of Microbiol. & Hyg., Baku, Azerbaijan.]

This paper deals with 41 cases of undulant fever, of which 12 had been contracted in the laboratory. Agglutination tests were carried out in all cases and the titre varied from 1/100 to 1/4000. In 5 cases blood cultures were attempted, with 2 positive results. Some of the cases continued for two years, and it is interesting to note that the titre of agglutination gradually increased during this period from 1/100 to 1/2000. In some cases, however, the reaction became negative and did not reappear. The complement fixation reaction was in parallel with the agglutination tests. The intradermal reaction of Burnet gave contradictory results.

D. H.

Montagnani (Mario). Sulle forme pseudoaddisoniane. (A proposito di una sindrome di tipo addisoniano da febbre maltese). [**The Syndrome of Addison's Disease occurring in Undulant Fever.**]—*Riv. Clin. Med.* 1927. Mar. 15 & 30. Vol. 28. Nos. 5 & 6. pp. 165–185 ; 209–231. [Numerous refs.]

This article is of interest from two points of view. The case recorded affords an instance of the protean manifestations of undulant fever, and adds yet another to the list of conditions other than true Addison's disease in which the signs of adrenal insufficiency are prominent.

Barbàra in 1920 was the first to describe a case of undulant fever with the Addisonian symptom-complex and, in fact, as a result of experimental inoculation of laboratory animals with *Br. melitensis* found lesions of the adrenal cortex—haemorrhage, necrosis, lymphocytic infiltration and fibrosis. The subject of the present article appears to be the second instance.

The patient was a woman of 48 years, who fell ill with undulant fever in December, 1925. After five or six weeks she moved to the hills, where she remained for 4 months, and it was towards the end of this period that the

symptoms referred to began to appear—increasing weakness and prostration, with pigmentation, a general darkening of the skin, but more intense over sites of pressure. During the succeeding two months there was a recurrence of the fever, and gastric disturbances supervened with attacks of epigastric pain. Haemoculture was negative, but the serum agglutinated *Br. melitensis* in a dilution of 1:800. The minutest details are given of the examination of the various organs, systems and body-fluids; the patient was in very truth long-suffering. Most of the results, as would be expected, were negative, with the exception of those pointing to affection of the adrenals. The blood-pressure was low, the systolic being only 100 mm. Hg. (Riva-Rocci) and the pulse-pressure 44 mm. In December, 1926, after treatment, this improved, the systolic pressure being 135 mm. and the diastolic 90 mm. The examination of the nervous system was most thorough and the results are recorded in terms of endocrine disturbance as a marked want of equilibrium in both tonus and excitability, a hyper-orthosympathicotonia, etc.

To the question why the *melitensis* infection should have given place to the syndrome of Addison's disease the author replies that the toxin of this infection can produce the symptoms [which, after all, savours rather of tautology than of explanation. The record with its wealth of detail will constitute a work of reference should future cases of a similar nature be met with.]

H. Harold Scott.

Sappa (S.). Forma pseudo-tubercolare della febbre di Malta. [**Undulant Fever simulating Tuberculosis.**]—*Riforma Med.* 1927. Dec. 5. Vol. 43. No. 49. pp. 1167–1170. [35 refs.] [Civil Hosp. Cuneo.]

The author records three cases as examples of undulant fever simulating pulmonary tuberculosis. The resemblances were certainly very close—wasting, sweating, fever, cough, mucopurulent and even bloody sputum, and physical signs such as dulness to percussion, falling in of the supraclavicular regions, and the presence of râles. In each blood-culture for *Br. melitensis* was negative, but the serum agglutinated the organism in a titre of 1 : 700 or higher. The tuberculin reaction was positive in all. The blood-picture showed a reduction of erythrocytes to between 3 and 4 million per cmm., and a little leucocytosis, with a marked relative lymphocytosis, in one patient as high as 84 per cent. All three improved rapidly after an injection with antimelitensis serum followed by vaccines, and left hospital apparently quite well within three months of coming for treatment.

H. Harold Scott.

Olivero (Carlo). Note ematologiche sulla febbre melitense. [**Note on the Haematology of Undulant Fever.**]—*Riforma Med.* 1928. Feb. 20. Vol. 44. No. 8. pp. 197–198. [13 refs.] [Hosp. of St. John Baptist, Turin.]

A brief account is given of four cases of this disease in which numerical examination of the white corpuscles was made. The total leucocytes varied between 7,200 and 8,400 per cmm., and the differential count gave a large mononucleosis (including transitional forms) of between 27 and 38 per cent. at the expense almost entirely of the polymorphonuclears.

H. Harold Scott.

Scott (R. W.) & Saphir (O.). *Brucella melitensis* (*Abortus*) **Bacteremia associated with Endocarditis.**—*Amer. Jl. Med. Sci.* 1928. Jan. Vol. 175. No. 1. pp. 66–69. With 2 figs. on 1 plate. [2 refs.] [Cleveland City Hosp. & Western Reserve Med. School, Cleveland, Ohio.]

This was a case of fever in a white male—a Hungarian, aged 21—who gave a history of acute rheumatic fever at age 13 and a second attack when he was 19 years of age.

He was admitted to the City Hospital, Cleveland, in January, 1926. He gave a history of fever and chills and pain over the region of the heart of one month's duration. On examination there were signs of mitral stenosis and a faint diastolic murmur could be detected over the aortic area, but the pulse was not of the Corrigan type. Several blood cultures were taken, but all were negative. A tentative diagnosis of subacture bacterial endocarditis superimposed on an old mitral and aortic lesion of rheumatic origin was made. The patient left hospital at his own request and contrary to advice, but was again admitted in August, 1926, in acute distress from abdominal pain in the region of the spleen ; there was also some paresis of the right arm and difficulty of speech, suggesting splenic infarct and embolism.

A blood culture was taken shortly after admission and from it a gram-negative bacillus was obtained. The same organism was obtained repeatedly during the month that the patient lived. The cultures taken in broth showed no change till the 6th day, when a faint cloudiness appeared. Sub-culture on agar showed growth after 2 days. The bacilli or cocci were non-motile, fermented no carbohydrate and did not liquefy gelatine. The patient's serum agglutinated the bacilli up to a dilution of 1/1000 ; control sera negative. A rabbit injected intravenously with 1 cc. of a suspension from an agar culture was sick for a few hours, but two days later appeared normal. Fourteen days later the rabbit was injected intravenously with 2·5 cc. of suspension and died three days later, and the bacillus was recovered from the heart blood and the spleen. The serum of this animal agglutinated the bacillus up to 1/3000 ; controls negative.

A stock *melitensis* serum was obtained and also stock cultures of *Br. melitensis* and *Br. abortus*. With this serum the patient's bacillus was agglutinated up to a dilution of 1/1600. The patient's serum agglutinated *melitensis* up to 1/800 and *abortus* to 1/1600. Absorption experiments indicated that the patient's bacillus was of the *abortus* variety. The post-mortem revealed a chronic pericarditis and endocarditis, with an acute inflammatory condition of the endocardium superimposed.

The authors are not prepared to say that this endocarditis was actually caused by *melitensis*, but prefer to describe the case as one of acute and chronic endocarditis associated with *Br. abortus* bacteraemia.

D. H.

Lemierre (A.), Marchal (G.) & Jaubert (A.). Un cas de fièvre ondulante autochtone. Valeur diagnostique et thérapeutique de l'intradermoréaction de Burnet. [**An Indigenous Case of Undulant Fever. Diagnostic and Therapeutic Value of the Intradermal Reaction of Burnet.**]—*Bull. et Mém. Soc. Méd. Hôpit. de Paris*. 1927. Dec. 29. Year 43. 3rd Ser. Vol. 51. No. 37. pp. 1702–1709. With 2 charts.

This is a description of a long-drawn-out case of undulant fever lasting more than five months. At first the case was considered to be influenza, and later rheumatism, endocarditis and tubercle were suggested. Blood cultures taken on two occasions were negative. There was no enlargement of the spleen until the sixth wave of fever had occurred.

The fever commenced in January, 1927, and it was not till May 22nd that a positive blood culture was obtained. On May 3rd an intradermal injection of " melitine " was made—1/10 cc.—and this was followed by a strong positive local reaction and also a marked general reaction. This general reaction was followed by fever for four days, then convalescence set in and complete recovery followed. The blood count showed a slight degree of anaemia with a leucocytosis, at first mononuclear but 30 hours later polynuclear.

The blood serum heated to 56° C. gave a positive reaction in a dilution of 1/200 with *Br. melitensis* and *Br. abortus* ; heated to 65° C. no reaction with either. In view of the greater thermo-stability of the *abortus* agglutinins this, in the author's view, pointed to a diagnosis of *melitensis* infection.

There was a history of consumption of cheese made from goats' milk. There were no other cases anywhere in the neighbourhood.

The authors discuss the laboratory diagnosis and point out the necessity of keeping a blood culture for at least 20 days before giving a negative answer. They are also convinced of the utility of " melitine," not only as a diagnostic, but as a therapeutic agent, and recommend its use in all cases of undulant fever.

Friedlander's bacillus was isolated from the urine in the course of the disease.

D. H.

DEBRÉ (Robert), MARIE (Julien) & GIROUD (Paul). Fièvre ondulante autochtone. Intérêt de l'épreuve à la mélitine de Burnet. [**Indigenous Undulant Fever in Paris. Observations on the Dermal Reaction of Burnet.**]—*Bull. et Mém. Soc. Méd. Hôpit. de Paris.* 1927. Dec. 22. Year 43. 3rd Ser. Vol. 51. No. 36. pp. 1654–1663. [2 refs.]

The case fully described is that of a boy of 11 years who had never left Paris and who had had " waves " of fever for some months without a definite diagnosis having been reached.

He had complained of great lassitude and pains in the joints and limbs, and was seen by the authors on April 5th, 1927. On January 22nd, 1927, the appendix had been removed on account of severe pains in the abdomen but without effect on the temperature, which had risen again a few days after the operation. He was carefully examined on April 5th, and the only physical sign noted was enlargement of the spleen. The cuti-reaction with tuberculin was negative, and a blood count showed a leucocytosis with scarcity of polynuclear cells.

Red cells	5,470,000 per c.mm.	
White cells	16,000 ,,	
Polymorphs	21 per cent.	
Lymphocytes	14 ,,	
Large mononuclears ...	1 ,,	78 per cent. mononuclears.
Mononuclears ...	42·5 ,,	
,, granular	19·5 ,,	22 per cent. polynuclears.
Transitionals	1·5 ,,	

The parents informed the authors that the child consumed unboiled goats' milk each summer purchased from an itinerant goatherd in Paris. The diagnosis of undulant fever was therefore considered and verified by means of the laboratory examinations. The heated serum gave a positive reaction in a dilution of 1/100 for *Br. melitensis* and *Br. abortus* ; negative for *paramelitensis* and the typhoid group. The intradermal reaction with Burnet's melitine was carried out on several occasions, at first as a means of diagnosis and latterly as a method of treatment. On April 26th a dose of 2/10 cc. was given by the intradermal route and gave a strongly positive local reaction, and in addition a general reaction evidenced chiefly by a

marked rise of temperature. This local and general reaction followed each intradermal dose, and at the same time there was some improvement in the child's condition. This improvement following doses of melitine had already been noted by BURNET.

The diagnosis of the case was finally settled by a successful blood culture. The organism took 7 days to show up in the flasks of broth to which the blood had been added. Specific sera were not to hand, but the non-Gram staining coccus which grew out in agar from the broth culture was shown to be *Br. melitensis* and was agglutinated to the same titre as stock *Br. melitensis* by the serum of the patient. The patient continued to run a temperature until August, when the fever ceased and he regained his usual health, but the spleen remained enlarged.

The points emphasized by the authors are the fact that the consumption of unboiled goats' milk in Paris itself may give rise to undulant fever, and that the intradermal reaction of BURNET is useful in diagnosis and possibly also as a therapeutic measure.

ZOELLER, who took part in the discussion, said in his hands injection of blood (5 cc.) taken from the patient himself and given every 5 days had yielded good results.

D. H.

WORDLEY (E.). **A Note on Two Unusual Cases of Fever.**—*Lancet.* 1927. Dec. 17. p. 1290.

The two cases were similar, so only one is described in detail. This was in a man, aged 36, who had not been abroad for two years. The clinical description of the case is that of typical undulant fever with marked weakness and severe pains in the joints. There were several waves of fever and the total duration of the illness was at least two months. The agglutination test for enteric fever was negative, but for *Br. melitensis* positive to a dilution of 1/600. Blood culture and urine culture were sterile. The agglutination test with *Br. abortus* was not carried out. Careful enquiry was made regarding cases of abortion in cattle, but no history of such could be obtained ; no goats were kept in the neighbourhood.

The second case was similar clinically, and so also were the results of culture and the agglutination tests, the latter being positive in the same dilution as in the first case.

The author asks what significance may be attached to a positive agglutination titre against *Br. melitensis* in a dilution of 1/600. The query is answered by Dr. MANSON-BAHR in a letter to the *Lancet* of December 31st of the same year entitled " Is it undulant or abortus fever in Great Britain." He refers to two cases which came under his care. In one a gentleman owned a herd of cattle in which contagious abortion was prevalent. He was in the habit of drinking unboiled milk from the cows and developed an attack of undulant fever. The blood serum agglutinated *Br. melitensis* in 1/800 and *Br. abortus* in 1/1200. The second case was that of a gentleman who suffered from fever for over four months. whose serum agglutinated *Br. abortus* in 1/160 and *Br. melitensis* in 1/640. Dr. MANSON-BAHR considers that these reactions, provided the serum has been heated to 56° C., are diagnostic, and a like remark applies to Dr. Wordley's results. Dr. MANSON-BAHR quotes two cases of severe undulant fever diagnosed on clinical grounds and by isolation of the organism from the blood and from the urine, and in neither was the agglutination titre higher than 1/80.

D. H.

MANSON-BAHR (Philip). **Fever of the Undulant Type in England and on the Possibility of the Occurrence of *B. abortus* Infection in Man with an Account of Two Cases observed.**—*Abhandl. a. d. Gebiet d. Auslandskunde. Hamburg. Univ.* 1927. Vol. 26. (D., Med. & Vet. Vol. 2.) [Festschrift NOCHT.] pp. 274–277. With 1 plate. [14 refs.]

The gist of this paper is contained in the author's letter to the *Lancet* of December, 1927, noticed above. In addition to describing two cases of undulant fever in England which came under his care, he brings forward evidence in favour of the view that undulant fever in various countries may be caused by *Br. abortus* either by the drinking of the milk of cows suffering from infection or by contact with diseased animals, either cows or pigs.

[This view is apparently not generally accepted in Germany, as is shown in the paper by BASTAI summarized in this number. These authors consider that *Br. melitensis* and *Br. abortus* cannot be distinguished bacteriologically, but that the former is pathogenic for man and animals, the latter for animals alone.

It is obvious, however, from a study of the two cases reported in this paper and of the other cases referred to, that undulant fever may arise where goats and goats' milk can be entirely excluded as sources of infection and cows' milk is the obvious cause.]

D. H.

MESSIERI (Albino). L'infezione melitense dell'uomo di origine bovina. [**Infection of Man by Brucella of Bovine Origin.**]—*Nuova Veterinaria.* 1928. Jan. 15. Vol. 6. No. 1. pp. 3–11. [Royal Inst. Vet. Med., Bologna.]

This article gives a good summary of the abortus-melitensis problem up to recent times from which the author draws the following conclusions: 1. That cattle suffering from epizootic abortion can transmit to man infection which produces a septicaemic type of fever resembling undulant fever ; 2. That this is most likely to arise when the bovine infection has been recently acquired from goats or sheep ; 3. Admitting the possibility of transmission of infection from cattle to man, and the possible short period of contagion of cattle, the organisms presenting the same characters, it is held that *Br. abortus* and *Br. melitensis* are essentially one and the same, but varying in degree of virulence for man according to the source whence the infection was acquired.

H. Harold Scott.

BASTAI (Pio). Ueber die Frage der Banginfektion beim Menschen. Abortusinfektion beim Menschen oder Melitensisinfektion beim Rind ? [**The Question of Abortus Infection in Man.**]—*Muench. Med. Woch.* 1927. Dec. 16. Vol. 74. No. 50. pp. 2141–2142. [12 refs.] [Med. Clinic., Univ. Turin.]

The argument is sustained thus : The bacilli of Bang and of Bruce cannot be distinguished bacteriologically. The experimental results favour the pathogenicity of the latter for cattle and are against that of Bang's bacillus for man. A study of the epidemiology leads to two conclusions : (1) At the Tunis Pasteur Institute, laboratory infection with melitensis is so common that preventive inoculation is compulsory,

but in the veterinary laboratory where foetuses and membranes of infected cattle are examined daily, infection is unknown; nor are the veterinarians who vaccinate against abortion with living virulent bacilli ever attacked; (2) the areas of distribution of melitensis and abortus infection do not correspond: indeed, in districts where abortus is most common melitensis infection is absent.

A. G. B.

LEDOUX, ARCHER & CLERC. Fièvre ondulante d'origine bovine. [**Undulant Fever of Bovine Origin.**]—*Bull. et Mém. Soc. Méd. Hôpit. de Paris.* 1928. Feb. 23. Year 44. 3rd Ser. Vol. 52. No. 6. pp. 290–294.

The authors discuss the close affinity of *Br. melitensis* and *Br. abortus* and recall that COURTOIS-SUFFIT treated a case of *melitensis* infection successfully by injections of the endo-protein of *abortus*. They also point out that in 1923 NICOLLE inoculated five volunteers subcutaneously with a culture of *Br. abortus* without any effect. They conclude that neither by their cultural, morphological nor serological reactions can these organisms be separated the one from the other. Their pathogenicity or non-pathogenicity for man alone distinguishes them. They point out, however, that in recent years, in all parts of the world—Rhodesia, America, Italy, France—cases of undulant fever have arisen whose serum agglutinates both *Br. melitensis* and *Br. abortus* in equal titre, in which there has been no contact whatever with goats or goats' milk but close association with cows which have suffered from epizootic abortion.

The authors describe a third case in France of this nature.

This was the case of a farmer in the Jura district. He had no goats on his farm or in his neighbourhood, but six of his cows had aborted and he himself had looked after them and had drunk the milk. In June, 1927, about a month after the last case of abortion in the cows, the farmer developed a dry cough, with slight fever, and sweatings, pains in the back and limbs. A diagnosis of tubercle was made. By September the fever definitely took on the undulant type and the spleen became enlarged. Two blood cultures, taken at 10-day intervals after four months' fever, were negative. [Cultures only kept for 8 days.] The serum of the patient agglutinated *Br. melitensis* up to a dilution of 1-2000 and two strains of *abortus*, one from the Pasteur Institute and one from Italy, at the same titre. Heating the serum to 65° C. for thirty minutes removed all agglutinins both for *melitensis* and *abortus*, which is not in accordance with the findings of FICAI and ALESSANDRINI, who suggest this method for differentiating the two infections, since they consider that the *abortus* agglutinins are more thermo-stable.

Absorption of the diluted serum of the patient with thick emulsions removed the agglutinins both for the homologous organism and for *abortus*, and absorption with *abortus* also removed all agglutinins. A double intradermal reaction was carried out with 2/10 cc. abortine and a like dose of melitine. Both gave a strongly positive reaction. No difference could be made out between the two results. The only reservation made is that the patient had already received eleven doses of *melitensis* vaccine, and for this reason too much stress cannot be placed on the intradermal tests.

The authors sum up by saying that this was a typical case of undulant fever due to an infection of an unidentified member of the *Brucella* group, but undoubtedly of bovine origin.

D. H.

VAN DER HOEDEN (J.). De abortusbacterie van het rund (bact. abortus infectosi Bang) ziekteverwekker bij den mensch. [**The Abortus Bacterium of the Cow causing Disease in Man.**]—*Tijdsch. v. Diergeneesk.* 1928. Mar. 1. Vol. 55. No. 5. pp. 209–224. English summary p. 226. [50 refs.] [Central Public Health Lab., Utrecht.]

The author remarks that with a view to determining the pathogenicity of *Br. abortus* for man it is of prime importance to study every case of undulant fever arising in countries or districts where *Br. melitensis* infections are unknown ; and he adds, with truth, that simple demonstration of agglutinins for *Br. abortus* in the serum of human cases is not sufficient evidence. He then proceeds to describe a case, the first in Holland, of infection of man by an organism derived from cows subject to epizootic (contagious) abortion.

The patient was a baker, aged 48, living in a small village in Holland, the owner of six cows. For six months previous to the date of his coming under notice he had suffered from what was evidently a typical attack of undulant fever. The agglutination test for typhoid carried out at various times was entirely negative, whereas *Br. abortus* was agglutinated to a titre of 1/6400 and *Br. melitensis* to 1/800 by the serum of the patient. The complement fixation test with the serum gave a positive reaction when an emulsion of *Br. abortus* was used as antigen and a " partial " positive with *Br. melitensis*. Attempts to cultivate the bacillus from the blood and urine were unsuccessful. The intradermal injection of abortine and melitine gave a strong positive general and local reaction. Of 11 controls 3 gave a local reaction ; none a general reaction.

Four of the five cows belonging to the baker had aborted between February and the end of May, 1927. He himself on these occasions had attended to the cows, and the last time he had a small wound on the hand. He took no precautions in the way of disinfection and became ill, as already said, with an undulant fever in May, 1927. Three of the cows showed a positive agglutination of *Br. abortus* up to a dilution of 1/1600 or 1/3200 and controls only to 1/50.

The baker had never left his own neighbourhood and he kept no goats, nor were there any imported goats in the neighbourhood.

[This appears to be a very clear cut case of infection directly derived from cows the subjects of contagious abortion, although it is not stated whether the man drank the unboiled milk of the cows ; but apparently his was the only case of this fever and he alone attended the sick cows. It is also unfortunate that the organism was not isolated from the cows or from the baker.]

D. H.

HABS (Horst). Die Menschenpathogenität des *Bact. abortus* Bang. [**The Pathogenicity for Man of** *Br. abortus* **Bang.**]—*Klin. Woch.* 1928. Mar. 4. Vol. 7. No. 10. p. 453.

The author refers to five recent cases of undulant fever in man in Germany which were attributed to infection by *Br. abortus*. All occurred in veterinary surgeons who had been in contact with cows suffering from epidemic abortion.

In the medical clinic at Kiel there were under the author's care at one and the same time four cases of undulant fever which were clinically typical of this infection, with enlarged spleen, leucopenia, etc., but in none of the patients was there any evidence of association with animals

suffering from abortion, nor any history of the consumption of goats' milk, but all four gave histories of the consumption of unboiled cows' milk, and the author considers that the infection was thus acquired.

The serum of the patients agglutinated *Br. abortus* in a dilution of over 1/1000, and, in one case, a bacterium was isolated from the blood which was in morphology, in cultural characteristics and by serological tests identical with *Br. abortus* of animal origin.

The author adds that in none of his cases was there any evidence of infection by *Br. melitensis*, but that this organism cannot be differentiated by any method of laboratory technique from *Br. abortus*.

[Apparently the author considers that if a coccus is derived from cows, whether they are suffering from abortion or not, it is *Br. abortus*; whereas if the coccus is derived from goats' milk, it is *Br. melitensis*. But he overlooks the possibility of the infection of cows derived from goats. It would be better, in view of his statement that *Br. melitensis* cannot be distinguished from *Br. abortus*, if he had said that these cases were cases of undulant fever infected with one of the *Brucella* group of bovine origin.]

D. H.

CLARK (Taliaferro). Recherches récentes sur la fièvre ondulante aux États-Unis d'Amérique. [**Recent Researches into Undulant Fever in the U.S.A.**]—*Bull. Office Internat. d'Hyg. Publique.* 1927. Oct. Vol. 19. No. 10. pp. 1460–1462.

Up to recent years it was believed that undulant fever in the United States of America was confined to the Mexican frontier. But lately it has been definitely recorded as occurring in Texas and in Arizona. In 1922 a small epidemic was recorded in Phoenix, in Arizona. Practically all the cases gave a history of the consumption of goats' milk. The clinical type of the disease, the causal organism and the source are the same as those of the similar infection in the Mediterranean.

But more recently it has been found that in the United States infections occur due to the bovine variety, *Br. abortus*. This bacillus causes contagious abortion both in pigs and cattle. Abortion in pigs is extremely common, these animals are all intended for the slaughter-house, and are sent there irrespective of infection. As a result cases of undulant fever are fairly common among workers in the abattoirs.

An infected cow although apparently in good health may continue to excrete the bacillus in the milk for many months. Many people, therefore, are exposed to infection from consumption of such milk unless it is pasteurized, but fortunately *Br. abortus* in milk is not highly pathogenic for man. Yet undoubted cases of infection from *Br. abortus* in raw cow's milk have been recorded in America, as evidenced by the absorption of agglutination tests and the isolation of the organism from the cow's milk.

The Hygiene Laboratories in Washington have reported 23 cases of undulant fever due to *Br. abortus* in the last five years. In 8 of these infection was traced to the consumption of milk; 2 were laboratory infections; in 6 others infection was contracted by handling sick animals —pigs or cows; 1 other case was that of an agricultural expert who was called in to advise in the treatment of abortion in cattle on a farm—16 days after his visit he developed undulant fever, from which he died. These cases were scattered over eleven different States in North America.

One hundred and ten sera which did not react to typhoid were tested against *abortus* and 6 showed a high titre for this organism of diagnostic significance.

D. H.

Orr (Paul F.) & Huddleson (I. F.). **An Epidemiological Study of Undulant Fever in Michigan.**—*Amer. Jl. Public Health.* 1927. Dec. Vol. 17. No. 12. pp. 1242–1247.

In the last three or four years 16 cases of undulant fever have been notified. In 6 of these *Br. abortus* was isolated from the blood and urine; the sera of the remaining 10 agglutinated *Br. abortus* up to 1/640 to 1/10,000. All the cases were clinically typical of undulant fever. Six of the cases lived on farms, the remainder in cities of varying size. The ages of the patients ranged from 9 years to 63 years.

Seven of the 16 had quite definitely never had anything to do with cattle or hogs. Four gave a history of abortion in their cattle. In no case was there a history of contact with goats or the consumption of goats' milk, but all gave a history of the consumption of unboiled cows' milk, a history of abortion in the cows which yielded the milk was obtained and *Br. abortus* was actually isolated from the milk.

In one case a man who previously had not been in the habit of drinking milk, except in small quantities in tea, commenced to drink a pint a day. A month or so later he went down with undulant fever.

There were no secondary cases in any of the households in which cases had occurred.

It is believed that one-third of the cattle in the State are infected; but abortion in hogs in Michigan is very rare. It is probable that cases in human beings have been missed, but there are not a great number owing probably to the low pathogenicity of *Br. abortus* for man by the oral route.

The authors conclude that even in the patients who were employed on farms where abortion in cattle had occurred, the infection had been caused by the consumption of milk and not by contact.

D. H.

Wollman (E.). Le rôle des mouches dans le transport de quelques germes importants pour la pathologie tunisienne. [**The Rôle of Flies in the Spread of Germs in Tunis.**]—*Arch. Inst. Pasteur de Tunis.* 1927. Dec. Vol. 16. No. 4. pp. 347–364. With 4 text figs. [5 refs.]

The rôle of flies in the spread of undulant fever.—The flies used in these experiments were bred out in sterile excreta from eggs, the surface of which had been sterilized by perchloride of mercury. (Flies in Tunis have ready access to material contaminated with *Brucella melitensis*, such as goats' milk and goats' urine.) The actual organism used in the experiments was *Br. abortus*, not *Br. melitensis*.

(1) A fly—*M. domestica*—was introduced into a tube containing a broth culture of *Br. abortus*, then transferred to a sterile tube, and three days later to an agar tube; no growth.

(2) Three aseptic flies were placed in a vessel containing cotton-wool soaked in a broth culture of *Br. abortus*; 18 hours later they were placed in a sterile tube, and 48 hours later transferred to an agar tube. Result, no growth.

(3) One aseptic fly was experimentally contaminated with *Br. abortus* culture ; 24 hours later placed on agar. Result, no growth.

(4) One green fly (*Lucilia*) was introduced into a sterile tube containing cotton-wool soaked in *Br. abortus* culture ; 48 hours later transferred to a tube of agar. The fly adhered to the agar and died there ; around it a growth of *Br. abortus* spread.

(5) Two *M. domestica* (aseptic) were placed in a tube containing cotton-wool soaked in *Br. abortus* culture fluid ; 24 hours later transferred to agar. Result, growth.

Flies up to 24 hours are capable of transmitting *Br. abortus*, and presumably also *Br. melitensis*, but after 48 hours they free themselves from infection (auto-sterilization).

D. H.

BURNET. Impossibilité de vacciner la chèvre contre le *M. melitensis* par des doses énormes de vaccin. [**Impossibility of vaccinating the Goat against *Br. melitensis* by Enormous Doses of Vaccine.**]—*C.R. Acad. Sci.* 1927. Dec. 27. Vol. 185. No. 26. pp. 1627–1629. [3 refs.] Also in *Arch. Inst. Pasteur de Tunis*. 1928. Mar. Vol. 17. No. 1. pp. 73–78. [3 refs.]

Preventive vaccination of the goat against *Br. melitensis* is the best prophylaxis against undulant fever. Unfortunately, every time that science makes a step towards this end, the goal recedes before her. The goat has a natural resistance to *Br. melitensis* and can clear itself of the infection.

The author's idea was that previous efforts had been made with too small doses and that what was wanted was very large doses. ASCOLI and SANFILIPPO had vaccinated goats, using enormous doses of vaccine—2, 4, 8 and 18 petri-dish cultures killed by heat and injected at intervals of 10 days. Two goats so treated showed no infection when subsequently tested by the oral route and by inoculation. Burnet was not able to confirm this observation. A young goat received the following doses of heated *Br. melitensis* :—

June 16th ...	Approximately 25 milliards of heated *Br. melitensis*.
June 27th ...	Approximately 80 milliards of heated *Br. melitensis*.
July 12th ...	Approximately 20 milliards of heated *Br. abortus*.
July 21st ...	Approximately 35 milliards of heated *Br. melitensis*.
August 8th ...	Approximately 1,200 milliards of formalized *Br. melitensis*.
August 19th ...	Blood culture negative.
Sept. 16th ...	Sero reaction 600++
Oct. 18th ...	Test dose, 2 milliards living *Br. melitensis* under the skin.

TABLE.

		Vaccinated Animal.	Control.
Nov. 2nd ...	14th day after test dose ...	+	+
	Blood culture agglutination...	800	2,500
Nov. 12th ...	24th day after test dose ...	+	+
	Blood culture agglutination...	1,000	1,400
Dec. 14th ...	56th day	+	—
	Haemoculture agglutination	800	800
Jan. 4th ...	77th day	—	—
	Haemoculture seroreaction ...	600	1,000

All three blood cultures were positive in both animals, showing that the previous inoculations had not prevented a general blood infection.

Burnet considers that the goat cannot be immunized by vaccines but can establish a tolerance to the organism, and may finally free itself entirely from the infection.

D. H.

HADDON (E. H.). **Some Observations on *Bacillus abortus* and *Bacillus melitensis*.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1927. Nov. 25. Vol. 21. No. 3. pp. 221–226.

Investigations had been made at the Entebbe laboratory of the relationship between *Br. melitensis* and *Br. abortus*, but owing to pressure of other work the full programme laid down could not be undertaken. It was noted, however, that when these two bacteria were grown on the stock medium used for routine sub-culture (2 per cent. Difco peptone, 1·5 per cent. agar), pH 7·4, after a period of over one year, a distinct difference in growth was noted. The *abortus* cultures, with one exception, gave a tenacious, sticky growth on the agar, whereas *melitensis* showed no change. This change was not obvious to the naked eye, but was most evident when sub-cultures were made on to other media, when the "sticky" nature of the *abortus* culture was obvious.

An elaborate series of experiments was carried out to determine the sulphur-nitrogen ratio in the proteins of the bacteria, and for details of these reference should be made to the original paper; but the conclusion arrived at was, this ratio does not serve to distinguish the one group of organisms from the others.

When transferred to rich nutrient agar after subculture for some (five) months, the *abortus* cultures lost their sticky character, but regained it when again subcultured on the simple peptone agar.

The author concludes that these results reveal the existence of some physical difference between the strains of *melitensis* and *abortus*, but that this difference is one of degree and, in addition, requires a considerable time to demonstrate.

D. H.

MCALPINE (James G.). & SLANETZ (Charles A.). **Studies on the Metabolism of the Abortus-Melitensis Group. 2. Further Observations on Nitrogen Metabolism. 3. Glucose Utilization.**—*Jl. Infect. Dis.* 1928. Jan. Vol. 42. No. 1. pp. 66–72. With 2 charts. [5 refs.]; 73–78. With 1 chart. [5 refs.] [Storrs Agric. Experim. Station, Storrs, Connecticut.]

Forty-one strains were tested: 10 were *Br. abortus* of bovine origin, 10 of porcine, 10 of human and 11 were *Br. melitensis* strains.

By the methods employed it was shown that *Br. abortus* of bovine origin utilizes very little of the available glucose in its metabolic activity; on the other hand, *Br. abortus* of porcine and human origin and the strains of *Br. melitensis* utilized from 4 to 18 per cent. of this carbohydrate. By reason of this difference in the metabolism of sugar different amounts of the various nitrogen fractions are produced in culture media over an incubation period of 14 days. Indeed, the interesting point in these papers is that all the tests employed definitely divided the melitensis-abortus organisms into two groups—one group consisting of the *Br. abortus* of bovine origin and the other comprising *Br. abortus* of porcine and human origin and *Br. melitensis*.

It would appear that *Br. abortus* of human origin is more closely related to that of porcine origin than to the bovine variety; but it is possible that cows may on occasion be actually infected from pigs.

In view of the fact that certain strains of the abortus-melitensis group can utilize carbohydrate, the suggested name Alcaligenes for the group would appear to be erroneous.

D. H.

CERRUTI (Carlo F.). Ricerche comparative tra "M. melitensis" e "B. abortus" per mezzo delle rispettive agglutinine isolate. Considerazioni critiche. [**Comparative Research on** *Br. melitensis* **and** *Br. abortus* **by Means of Agglutination Tests.**]—*Bol. d. Istituto Sieroterap. Milanese.* 1927. Dec. Year 6. Vol. 6. No. 6. pp. 425–440. [40 refs.] French summary pp. 438–439. [Hyg. Inst., R. Univ., Turin.]

The author discusses work done by EVANS and others and the attempts to differentiate between *Br. melitensis* and *Br. abortus*, attempts which have so far failed.

The author selected three strains of *melitensis* and three of *abortus*; the three latter were obtained from cow, pig and sheep and from a district where epizootic abortion was common but undulant fever in man so far had not been noted.

He used the method of HAHN and TROMMSDORFF, later modified by OGATA. In this the bacteria are agglutinated by immune rabbit serum, treated by a centinormal solution of caustic soda, then centrifuged and washed several times in 10 per cent. solution of saccharose. This solution, which now contains some of the agglutinins, is freed from the remaining bodies of the bacteria by centrifuging and rendered isotonic by the addition of NaCl. The fluid was then employed to carry out a series of agglutination tests with the six selected strains of *Br. melitensis* and *Br. abortus*, but these failed to show any difference between the two classes.

The author also tried to differentiate between his strains by means of the ordinary absorption methods of CASTELLANI, but here also he failed to make out any distinctive difference between his strains.

He suggests that the only difference between these microbes is that the one, *abortus*, Bang, 1897, causes abortion in cattle, pigs and sheep, undulant fever being absent or extremely rare; the other, *melitensis*, Bruce, 1887, causes undulant fever in man and may be found in animals closely associated with such cases.

D. H.

FAVILLI (Giovanni). Studi sui batteri "Brucella melitensis." Le varietà abortus, melitensis, paramelitensis e i loro reciproci rapporti. [**Studies on** *Br. melitensis*, **the Relations of** *abortus, melitensis* **and** *paramelitensis*.]—*Bol. d. Istituto Sieroterap. Milanese.* 1927. Oct. Year 5. Vol. 6. No. 5. pp. 341–376. [31 refs.] German summary pp. 374–375. [Inst. Gen. Path. R. Univ., Florence.]

The author considers that the typical strains of the group Abortus-melitensis-paramelitensis, are those which are most sharply and clearly agglutinated by specific *melitensis* immune serum and are least susceptible to non-specific agglutination. The non-specific agglutination to which he refers is not group agglutination with sera

but agglutination by means of lactic acid, peptone and agglutination of emulsions by heat ; this last test is the one on which he places most reliance, but all three tests have been largely used by Italian workers to separate the various members of the group.

Working on these lines Favilli finds that *abortus* is the most typical, *melitensis* comes next in order, and *paramelitensis* he regards as atypical. But he adds that owing to variations in the capacity for agglutination by immune sera and in non-specific agglutination of *melitensis*, no sharp line of demarcation can be drawn between the different strains, but rather there is a gradual, unbroken series commencing with the most "typical" *abortus* strains and passing on, through various intermediates, to the most atypical, i.e., *paramelitensis*, which is only slightly agglutinated by *melitensis* immune sera and is non-specifically agglutinated. In addition to this, and as a further complication, he finds that these characters are not fixed, and different strains which have at times been specifically agglutinable lose this property and may acquire the property of non-agglutinability ; thus in his hands a *melitensis* strain may become indistinguishable from *paramelitensis*. This change, in the case of *melitensis*, may be spontaneous or can be produced artificially by subjecting strains of *melitensis*, and also of *abortus* to cultivation in the presence of immune serum.

By this process, to which he gives the name "serumization of broth cultures," he has succeeded in producing cultures of *abortus* and *melitensis* which are no longer agglutinable by specific serum and have acquired the property of non-specific agglutination.

The characters conferred by the action of immune serum are stable and transmissible through an indefinite number of passages.

The reason given for regarding *abortus* as being the type organism is that it is stable, i.e., does not become spontaneously atypical, although *abortus* strains do become so under the stimulus of serum. *Melitensis* is unstable in the direction of *paramelitensis*, which is atypical and stable.

The author is of opinion that the result of his work which has been confirmed by other Italian workers, is to suggest that this group is unstable but is homogeneous.

D. H.

Boncinelli (Umberto). Modificazioni osservate in stipiti di *Br. melitensis* ripetutamente coltivati in brodo. [**Changes seen in Strains of *Br. melitensis* Repeatedly cultivated in Broth.**]—*Bol. d. Istituto Sieroterap. Milanese.* 1927. Oct. Year 5. Vol. 6. No. 5. pp. 377–386. [15 refs.] German summary p. 385. [Inst. Gen. Path. R. Univ., Florence.]

The general idea in this paper is to show that the so-called *melitensis* and *paramelitensis* strains of *Br. melitensis* are not possessed of definite fixed characteristics, but as a sequence to the action of various agents can present modifications which can be transmitted in successive generations. If sub-cultures are made in broth from the sediment of a broth culture of *melitensis* of 5–7 days' growth, and this operation is repeated several times (from 5 to 15 transplants), a culture is finally obtained with all the characteristics of those of bacteria usually labelled *paramelitensis*. The same thing happens—although a greater number of passages are required—if one starts the sub-cultures from the supernatant fluid instead of from the sediment. The new characters of the *paramelitensis* so produced are fairly stable but may show some variation.

These facts, considered in connexion with the reports of other writers on the same subject, reinforce the opinion, already arrived at by FAVILLI by other methods, that *melitensis* and *paramelitensis* are at the extremes of a succession of forms closely related and linked up by a series of intermediate forms and belong to one definite bacterial species.

D. H.

OROYA FEVER AND VERRUGA PERUANA.

RIBEYRO (R. E.). Sur la verruga peruana. Unicité ou dualité? [**Verruga Peruana—One Disease or Two?**]—*Bull. Soc. Path. Exot.* 1927. Oct. 12. Vol. 20. No. 8. pp. 790–800. [11 refs.]

The author points out that up to the date of the expedition to South America (1915), of which Dr. STRONG was the leader, Oroya fever and verruga peruana were looked upon as one and the same disease, or rather as separate manifestations of the same disease. CARRION in 1885 inoculated himself with some material from the eruption of a mild case of verruga and contracted Oroya fever, from which he died. STRONG and his collaborators came to the conclusion that they were distinct diseases, for the following reasons :—

They successfully inoculated verruga from man to man and from man to experimental animals, and they were unable to obtain cultures of the organism, Bartonella, from the eruption of verruga peruana. Immunity experiments which were carried out appeared to support their view.

Ribeyro points out that the Strong expedition was not in the country for very long and saw only a small number of cases.

In a study of a large number of cases all types are met with, from the simple afebrile case of verruga to the fulminant type of fever with a pernicious type of anaemia, which is invariably fatal and does not go on to the verruga stage at all. On the other hand, in cases of Oroya fever which are not fatal convalescence is ushered in by the appearance of the verruga stage. In both types the Bartonella organism can be seen ; in the mild type very few, it is true, but in the severe type in enormous numbers in the blood cells. The organism has been cultured from both types.

Verruga peruana is found only in certain definitely circumscribed districts of Peru and Oroya fever is identical in its geographical distribution. It is necessary to stay at least one night in such districts to contract the disease ; journeys by day can be made with impunity.

It has also been noted that persons who have contracted verruga do not suffer from a second attack, nor do they subsequently contract Oroya fever, and *viceversa*. Also BATTISTINI has succeeded in producing the verruga eruption in monkeys inoculated with blood from cases of Oroya fever.

In view of the work of the older physicians and of recent experimental work, Ribeyro is convinced that verruga peruana and Oroya fever are manifestations of one and the same disease.

D. Harvey.

MAYER (Martin) & KIKUTH (Walter). Zur Aetiologie und Einheit der Verruga peruviana und des Oroya fiebers. [**Aetiology of Verruga Peruana and Oroya Fever. Their Unity.**]—*Abhandl. a. d. Gebiet d. Auslandskunde. Hamburg. Univ.* 1927. Vol. 26. (D., Med. & Vet. Vol. 2). [Festschrift NOCHT.] pp. 319–327. With 6 figs. on 2 plates. [17 refs.] [Inst. for Ship & Trop. Diseases Hamburg.]

In 1913 the senior author with ROCHA LIMA and WERNER transmitted verruga to monkeys [see Vol. 1 of this *Bulletin*, p. 727]. The inoculations were made above the eyebrow, and a single lesion resulted. In

1926 a sailor infected with verruga was admitted to the hospital of the Hamburg Institute and formed the subject of further experiments. The man had malaria parasites in his blood and on both legs several nodules of the size of linseeds or hazelnuts, moveable with the skin, not tender, of bluish sheen. On April 12th two nodules were removed, another on May 6th, and a fourth on May 18th. All were pronounced by Rocha Lima to be verruga nodules. The man had left his ship in Peru, wandered inland and been employed on a Peruvian railway, where he had been freely bitten by mosquitoes. The material removed served for microscopic examination and animal experiment.

The earlier experiments were fully confirmed. The nodule removed on May 6th gave rise to 4 passages in monkeys, when the last animal died with severe anaemia; that removed 12 days later gave rise to infection now in the 12th passage (1½ years). The papules which developed are described; they never occurred elsewhere than at the site of inoculation. Some of the experimental animals had their spleens removed before or after the inoculation with the object of seeing whether, as in the case of infectious anaemia of rats, general infection would be induced and Oroya fever develop; the operation was well borne. Twice occurred severe anaemia with fever and Bartonella in the blood and, in 3 cases, Bartonella appeared in the blood sparingly. Protocols of these 5 experiments are given; in all but one the spleen had been removed. Direct inoculation of Bartonella-containing blood was always negative. Of the monkeys employed the cynopithecus and mangabey yielded the largest papules, the Javanese monkeys the smallest.

In 1913 the senior author and his colleagues found in the spindle-cells (angioblasts) of Rocha Lima characteristic cell inclusions, brought out by various staining methods. With Giemsa the inclusions appeared brick red and consisted of a countless number of minute roundish bodies closely apposed. These observations have hitherto not been confirmed. In the fresh material, from man as well as from monkey, they were now elaborated and extended. To get good smears small pieces of the very tough material must be teased out with needles or fine forceps; the cells are often destroyed but the inclusions lie beside the nucleus. A rod-like appearance was not seen in the smears, but the size of the bodies corresponded with that of the roundish Bartonella forms. The inclusions were recognized also in sections and their restriction to the angioblasts was evident. The authors received preparations from Noguchi and a copy of his paper on the production of verruga nodules with cultures of Bartonella from Oroya fever [see this *Bulletin*, Vol. 24, p. 622]; he suggests that the reddish granules represent intracellular forms of *Bartonella bacilliformis*. The authors are convinced of the aetiological connexion of these inclusions with verruga. Doubtless, they write, they represent the form of the virus which determines the tumour formation of the verruga nodule. They are uncertain whether these are the primary stages from which free Bartonella develops or whether Bartonella which have penetrated the angioblasts there multiply; possibly they represent "intracellular cultures."

With Bartonella-containing blood of two monkeys the authors tried, intracutaneously, subcutaneously, by scarification and intravenously, to infect fresh monkeys. There was no single success, either local or general. The authors recall that Strong and his colleagues failed to infect animals with Oroya fever blood. They have examined Noguchi's records and find that with one exception all his successes

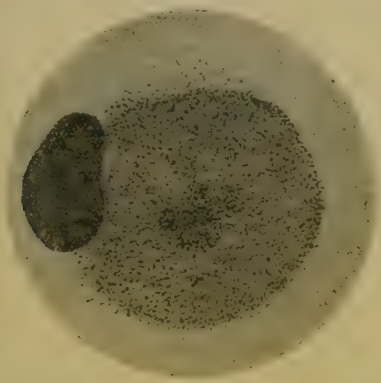
were obtained with juice from a nodule or with cultures; the blood from which the cultures were obtained did not infect. Perhaps not all stages of Bartonella are transmissible or certain disturbances of the organism, such as malaria, must precede infection. The significance of the infectious anaemia of rats which only appears after splenectomy and is due to a Bartonella is obvious here. At any rate the experiments, like those of NOGUCHI, show that purely local inoculation of verruga material into the skin may give rise to a fatal infection of Oroya fever.

NOGUCHI and BATTISTINI succeeded with ease in getting cultures from both Oroya fever material and from tissue and blood of verruga material, with such ease that for diagnosis NOGUCHI prefers this procedure to blood examination. The authors, following their technique exactly, failed except in one instance. Perhaps the cultivability of strains varies.

A. G. B.

DA CUNHA (A. M.) & MUNIZ (Julio). Recherches sur la verruga peruana expérimentale. [**Experimental Verruga Peruana.**]—*C.R. Soc. Biol.* 1927. Nov. 18. Vol. 97. No. 31. pp. 1368–1372. With 3 text figs. [Oswaldo Cruz Inst., Rio de Janeiro.]

This is an account of some experimental work done with a culture of *Bartonella bacilliformis* received from Professor NOGUCHI. Intradermal inoculations were made in two places on the right supra-orbital ridge of a monkey (*Pseudocebus* sp.) and subcutaneously in the thigh; 0·1 to 0·2 cc. of the 12-day old culture was used, the third passage made in the Institute from the original culture. A little of the same culture was rubbed into a scarified area on the left supra-orbital ridge of the same monkey.



Drawing of multiplication of Bartonella in an endothelial cell.
[Reproduced from *Comptes Rendus des Séances de la Société de Biologie*.]

On the 10th day two small nodules appeared on the right supra-orbital region. Blood culture was negative, and there was only a slight rise of temperature lasting one day. The animal was killed on the 22nd day. There was a nodule the size of a small nut over the site of the subcutaneous inoculation and several small nodules on the scarified area. Cultures of Bartonella were obtained from punctures of the

nodules, but blood cultures taken at the post-mortem were negative. Material was taken from the nodules and from various organs for section and smears were also made and stained by Giemsa. In these smears many endothelial cells were seen, the protoplasm of which was crammed with masses of small corpuscles, either granular or, in some cases, showing as small bipolar-staining rods. These bacillary forms could also be seen singly in the plasma and occasionally in small masses surrounded by a pale-blue cytoplasm, representing the remains of a disintegrated cell. None of these rods were seen in the red cells.

These cell-inclusions are similar to the bodies described by Mayer, Rocha Lima and Werner in verruga, and considered to belong to the Chlamydozoa; others are identical with the bodies described by Strong in the blood of cases of Oroya fever and considered by him to be multiplication forms of Bartonella.

The authors agree with Strong, but consider that these bodies are allied rather to Rickettsia than to the Haemosporidia, such as Theileria.

D. H.

Galliard (H.) & Robles (R.). Inoculation de la verruga au singe *Cynomolgus (cynomolgus) fascicularis* avec des cultures de *Bartonella bacilliformis*. [**A Monkey infected with Verruga by Cultures of** *B. bacilliformis*.]—*Ann. Parasit. Humaine et Comparée.* 1928. Jan. 1. Vol. 6. No. 1. pp. 1–3. With 1 text fig. [5 refs.] [Lab. Parasit., Faculty of Med., Paris.]

One of the authors received from Professor Noguchi a culture of *Bartonella bacilliformis* originating from a case of Oroya fever and brought it to Professor Brumpt in Paris.

Direct examination of this culture revealed nothing, even by dark-ground illumination. But inoculation of a scarified area on the supra-orbital region of Cynomolgus produced, after an incubation period of 21 days, a typical verruga lesion. At the same time a subcutaneous injection was made into the umbilical region and fever resulted 9 days after the inoculation. *B. bacilliformis* was not found in the blood.

This confirmed results previously obtained by Noguchi in America, namely that a culture of Bartonella isolated from a case of Oroya fever, if simultaneously inoculated under the skin and rubbed into a scarified area of the skin of a monkey, produces both a typical verruga lesion and also a fever, with anaemia, resembling Oroya fever.

D. H.

Noguchi (Hideyo). **Etiology of Oroya Fever. X. Comparative Studies of Different Strains of** *Bartonella bacilliformis*, **with Special Reference to the Relationship between the Clinical Types of Carrion's Disease and the Virulence of the Infecting Organism.**—*Jl. Experim. Med.* 1928. Feb. 1. Vol. 47. No. 2. pp. 219–234. With 4 plates. [9 refs.] [Rockefeller Inst. for Med. Research, New York.]

This paper consists of a study of nine strains of *Bartonella bacilliformis* isolated from the blood of cases of Carrion's disease (verruga). The blood samples were sent to the Rockefeller Institute in New York by Dr. Lorente, Director of the National Institute of Public Health, Peru.

Twelve samples in all were sent, but three were found to be contaminated. Eight of the cases from which the blood was taken had verrucous eruptions and three had fever and marked anaemia without eruption; one had neither fever nor eruption, but extreme anaemia. All the strains isolated were gram-negative and stained best with Giemsa's solution. The number of flagella varied among different strains, some showing a single flagellum, others as many as four. In all instances, however, the flagella were unipolar.

The original blood specimens received were used to inoculate two monkeys: specimens 1 to 6 gave no local lesion, but a positive blood culture was obtained from both animals inoculated. Of the nine successful cultures tested, six possessed definite specific pathogenicity for monkeys; the other three were non-pathogenic. The three non-virulent strains (which had yielded successful culture) came from cases of benign miliary or nodular verruga and in only one of these were Bartonella seen in the blood sample. The six pathogenic strains came from patients whose blood showed numerous Bartonella and who also had profound anaemia. That is, although it was possible to isolate Bartonella by culture in semi-solid media from cases of Oroya fever and also from mild verruga, yet the strains isolated from the former were pathogenic for monkeys, whereas the strains from the latter were not.

In highly susceptible animals the virulent strains may produce in monkeys a condition resembling Oroya fever and in more resistant animals verruga only. The same factors of virulence of the organism and varying susceptibility in man may account for the different clinical pictures met with in cases of the disease.

D. H.

Noguchi (Hideyo). **Etiology of Oroya Fever. XI. Comparison of *Bartonella bacilliformis* and *Bartonella muris*. Cultivation of *Bacterium murium*, n. sp.**—*Jl. Experim. Med.* 1928. Feb. 1. Vol. 47. No. 2. pp. 236–243. With 2 plates. [9 refs.] [Rockefeller Inst. for Med. Research, New York.]

Mayer has reported that the blood of splenectomized rats and mice showed the presence of an organism resembling *Bartonella bacilliformis*, and he gave the name *Bartonella muris* to this organism.

Noguchi compared these two organisms. He found that *Bart. muris* appeared in large numbers in the blood of white rats, wild rats, white mice and hamsters after removal of the spleen, but did not appear in the blood of monkeys, rabbits or guineapigs under the same conditions. It was not found possible to transmit *Bart. muris* to normal animals by injection of blood from splenectomized animals.

During the course of these experiments a small micro-organism was isolated in pure culture which caused orchitis in rats. This organism, although resembling *Bart. muris* in many respects, could not be definitely identified with it and therefore has been given the name "Bacterium murium."

Bartonella bacilliformis and *Bartonella muris* have distinctive morphological features, as also has *Grahamella talpae*, the last being the name given to cell-inclusions in the blood of the English mole, first described by Graham of Cambridge.

D. H.

Noguchi (Hideyo). **Etiology of Oroya Fever. IX.** *Bacterium peruvianum,* **n. sp., a Secondary Invader of the Lesions of Verruga Peruana.**—*Jl. Experim. Med.* 1928, Jan. 1. Vol. 47. No. 1. pp. 165–170. With 4 figs. on 1 plate. [3 refs.] [Rockefeller Inst. for Med. Research, New York.]

The author in investigating the causal organism of verruga (Carrion's disease) examined two subcutaneous nodules, excised under aseptic conditions, received from Professor Hercelles of Lima. A strain of *Bartonella bacilliformis* was isolated from one of these, but in addition another organism which resembled Bartonella morphologically but showed marked differences in cultural and pathogenic properties.

This organism grew well on ordinary culture media at 25° C., colonies appearing in 24 hours on agar ; on blood-agar plates haemolysis took place. A diffuse growth occurred in broth, and after a few days a distinct pellicle appeared. Serum was liquefied after about two weeks at 25° C. No carbohydrates were fermented. The organism was actively motile. Spirally-curved flagella, two to four in number, were seen to be attached at one pole. In this peculiarity it resembled *Bartonella bacilliformis.* It was Gram-negative, but stained with carbolfuchsin or methylene blue.

Intradermal injection of the bacterium gave rise to small necrotic areas which ulcerated and healed up again within 10 to 14 days ; unbroken nodules may also be found. Intravenous or intratesticular injection caused a fatal septicaemia in rabbits, guineapigs, rats and mice. *Post-mortem* the most striking feature was a marked parenchymatous degeneration and necrosis of the liver.

This organism which in some particulars—possession of unipolar flagella, non-Gram staining, no sugars fermented—resembled Bartonella, differed from it in growing readily on ordinary solid and fluid media and in its pathogenicity for animals.

In view of the fact that so far as can be ascertained, it has never before been met with, Noguchi regards it as a new species and has named it " Bacterium peruvianum."

D. H.

Weiss (Pedro). Hacia una concepción de la verruga peruana. [**A New Conception of Verruga Peruana.**]—*An. Facul. de Med.* Lima. 1928. Vol. 9. Nos. 4, 5 & 6. pp. 279–299. With 2 plates.

This is an interesting article linking up on immuno-biological principles the close connexion between Oroya fever and Verruga. The author maintains that the disease intimately concerns the reticulo-endothelial system, and that the reaction of this follows immediately on the haematic crisis, the eruption of verruga being the histioid result [if one may use the term] of allergy. In other words, at the termination of the haematic phase, the virus becomes fixed in the tissues and the histioid reticulo-endothelial reaction so produced leads after a varying interval to the production of the verruga nodules. The reaction is evidenced by destructive lesions in the endothelial cells of special function (vascular endothelium *sensu stricto*) with consequent formation of haemorrhagic foci, infiltration of leucocytes, and, in variable degree, proliferation of the perithelial cells ; this corresponds to the petechial eruption which sometimes precedes the verruga eruption proper. In addition to this there is proliferation in certain spots of carminophil or unspecialized haemohistioblastic cells, particularly in the lax connective tissue. Thus, the verruga nodule, formed by proliferative

reaction of the angioblastic or reticulo-endothelial cells, partakes of the character of an allergic reaction. The difference between the classical conception and that of the author may be schematically represented thus :

Classical.

Oroya fever — Calm Interval — Macroscopic eruption of Verruga.

Author's.

Haematic Phase (Oroya fever). Histioid Phase.

(1) Invasion—(2) Crisis—(3) Remission—(4) Reaction without eruption.—(5) Reaction with eruption.

H. Harold Scott.

Hercelles (Oswaldo). El gérmen de la verruga peruana. [**The Organism of Verruga Peruana.**]—*An. Facul. de Med.* Lima. 1926. Vol. 9. Nos. 4, 5, & 6. pp. 231–264. With 5 coloured plates.

The author reviews the question of the causative organism of Oroya fever and of Verruga peruana and gives a detailed account of his investigations and cultural findings.

In peptone broth to which the blood of a patient has been added the medium remains clear, but microscopical examination reveals small actively motile coccoid bodies, 0·2–0·5 micron in size, in two days, becoming more numerous, aggregated, and losing motility by the fourth to the fifth day. Subculture into various media—broth, agar, glucose-agar, lactose agar, gelatin, etc.—gave negative results, but with human blood and rabbit testis the same bodies were found to grow. Identical results were obtained with material from the nodules of verruga as from the blood of a febrile case. Growth occurs at 37° C. and is most profuse above the level of the sedimented red corpuscles in a whitish granular stratum. By the 8th day this has increased greatly and a pellicle or zoogloea forms, though the medium itself remains clear.

In the course of his summary the author shows that he made a definite communication of his results to the Faculty of Medicine on September 30th, 1925, and therefore claims priority for the discovery. He also states that the fact of his obtaining the same growth from the blood of febrile cases and from the verruga nodules shows the two to be manifestations of one and the same disease ; thirdly, the bacillary form is but a stage, the intracorpuscular form of that found in the peripheral blood, and the organism should therefore be called *Bartonella coccoides* rather than *Bartonella bacilliformis.*

H. Harold Scott.

DENGUE AND UNCLASSED FEVERS.

Pirot. Note sur quelques essais thérapeutiques dans la dengue. [**Some Therapeutical Trials in Dengue.**]—*Arch. Méd. et Pharm. Nav.* 1927. Oct.–Nov.–Dec. Vol. 117. No. 4. pp. 281–286. [6 refs.]

The author had come to the conclusion that the usual drugs employed in dengue (quinine, intestinal antiseptics, etc.) were of little use. It

happened that a patient under treatment for syphilis by novarsenobenzol developed dengue the day after he received a dose of 0·45 gm. of the drug. The disease was in no way aborted ; the only difference noted was that the rash was unduly marked.

Seventeen cases of dengue were treated with an intramuscular dose of 6 centigrammes of sulpharsenol on the first three days of the disease. In 9 there was a marked reduction in the temperature and no relapse, and decided amelioration of the joint and bone pains. In the other 8, the fever was of shorter duration than in the controls, and, although there were relapses, they were not so severe as in the untreated cases.

Treparsol by the mouth was also tried—1·0 gm. *per diem* for the first three days. Although the disease was not cut short by this drug, yet there was undoubted amelioration of all the symptoms —fever, backache, etc. Stovarsol was also used in the same manner, but in too few cases to give any opinion. The two methods—sulpharsenol by the intramuscular route and treparsol by the oral—were combined, with good results.

The best results of all, however, were obtained by the injection of 3 cc. of acetylarsan hypodermically. If given about the second or third day this drug, in the author's hands, aborted the fever, and he is of opinion that it is worthy of further trial.

D. Harvey.

Khouri (J.). Quelques observations parasitologiques et biochimiques concernant l'urine dans le fièvre " dengue." [**Some Observations on the Urine of Cases of Dengue.**]—*Bull. Soc. Path. Exot.* 1928. Feb. 8. Vol. 21. No. 2. pp. 92–94.

This investigation was carried out during the epidemic of dengue in Egypt between June and December, 1927. The cases were clinically typical of dengue. A search was made in the urine for the parasite of the disease. The urine was taken at or near the end of the pyrexia, centrifuged and the deposit stained by Fontana's method and examined. In two cases a few spirochaetes were found and these resembled in every particular the spirochaetes isolated by Couvy from the blood of cases of dengue in Beyrout in 1921 [this *Bulletin*, Vol. 20, p. 384.].

It has been stated that albuminuria does not occur in dengue as a rule ; the author found it present in a number of the cases, but only as a " trace." In one or two cases also tube-casts were seen, both granular and epithelial. Bile-pigments were variable in amount and the diazo-reaction was found positive in some cases, even in the apyrexial period. As regards the variation of the normal constituents of the urine, there was an increased elimination of phosphorus ; the urine remained acid in reaction ; there was a relative increase of the ammonia content and often a marked diminution of the amount of nitrogen.

D. H.

Cawston (F. G.). **Dengue Fever and Defective Gutterings.**—*Jl. Trop. Med. & Hyg.* 1927. Nov. 1. Vol. 30. No. 21. pp. 276–277.

The author points out that defective gutterings on houses may and do provide breeding places for mosquitoes. To provide against this he urges that in places where mosquitoes are prevalent bye-laws should be introduced to prevent the erection of houses without a sufficient

slope on the gutterings. He suggests a slope of 1 inch in every 12 feet, or 2 inches from each end of a 48 feet wall. To prevent splashing he recommends that the gutterings should be broader at the lower end. In such districts there should also be a down-pipe to every 24 feet of eaves-piping, thus ensuring efficient drainage.

D. H.

LEFROU (G.). Pseudo-dengue ou fièvre rouge congolaise. Considérations générales sur les fièvres éruptives tropicales. [**Pseudo-Dengue or Red Congolese Fever.**]—*Bull. Soc. Path. Exot.* 1927. Oct. 12. Vol. 20. No. 8. pp. 779–790. [13 refs.]

The author describes a case of fever, in French West Africa, in a European adult female, with a generalized morbilliform eruption, diagnosed in the first instance as measles by the embarkation medical officer. In 48 hours the eruption disappeared without desquamation. The rash had appeared suddenly after some days of indefinite malaise and vague pains in the arms and legs, without coryza, sore throat or the severe joint pains of dengue. Twenty days later a second identical case was observed, and twenty cases in all during the year have come under the author's observation. There is a moderate degree of fever, not exceeding 38·5° C. even at night, and nothing remarkable about the pulse rate. In one case only, an enlargement of the post-auricular and cervical glands was noted; in all other cases, although carefully sought for, no such enlargement could be made out, an observation which, in the author's opinion, excludes rubella. The eruption invariably disappeared in 48 hours. Convalescence was rapid and relapses were never noted. One similar case was noted in a native; probably other natives did not consider the illness worthy of report.

The author discusses the differential diagnosis. Is this disease German measles, dengue or another disease altogether? The main points of difference between this disease and German measles is the long period of malaise before the rash appears, the rapid disappearance of the rash and the absence of enlargement of glands. Koplik's spots were never seen. Dengue, on the other hand, occurs in epidemics, whereas cases of this disease occurred singly at intervals of weeks. The joint pains of dengue are much more severe than the mild discomforts of the exanthem under discussion. In dengue the fever is higher and relapses are common and desquamation is the rule. The author, however, stresses the point that the clinical descriptions of different epidemics of dengue vary in a remarkable degree; yet they have one point in common—their epidemic character. CLAPIER has noted a similar fever in French West Africa [see this *Bulletin*, Vol. 19, p. 66].

Having eliminated rubella and dengue as possible diagnoses, the author rejects the name "pseudo-dengue" and prefers the original term—"fièvre rouge Congolaise"—for this malady.

D. H.

LEGENDRE (J.). A propos de la fièvre rouge congolaise. [**Red Fever of the Congo.**]—*Bull. Soc. Path. Exot.* 1928. Jan. 11. Vol. 21. No. 1. pp. 18–20.

This article is a trenchant criticism of the contention of LEFROU that "fièvre rouge congolaise" is a separate and distinct disease. In Legendre's opinion it is simply mild sporadic dengue.

Some of his criticisms are very apt. Such as, "it is not necessary to measure the facial angle or to examine the blood of a Chinaman to tell

him from the local negroes." "To call '*Stegomyia fasciata*' '*Aëdes argenteus*' is not to create a new species of mosquito." "Because a man is small or even a dwarf it is not necessary to put him in a different race from that to which he apparently belongs."

With regard to LEFROU's argument that dengue occurs only in epidemic form, he points out that in the prevention of disease it is the sporadic cases and the first cases of an epidemic which present difficulty. He also quotes the opinion of a colonial medical officer of 25 years' experience, who says, "dengue is common ; if you look for the rash you will find it."

D. H.

BURNET (Et.) & OLMER (D.). La maladie de Marseille (fièvre exanthématique de nature indéterminée) est-elle la même maladie que la maladie de Brill (typhus bénin) et le "typhus tropical"? [**Is Marseilles Fever the Same Disease as Brill's Disease and Tropical Typhus?**]—*Arch. Inst. Pasteur de Tunis.* 1927. Dec. Vol. 16. No. 4. pp. 317–332. [9 refs.]

Since 1922 many cases of an exanthematous fever of undetermined nature have been reported in Marseilles. Clinically these cases resemble mild typhus (Brill's disease) and the fever described by FLETCHER in Malaya and named tropical typhus ; it also resembles the latter in the complete absence of lice from the patients.

The authors remark that if this disease is really Brill's disease, as has been suggested, then one should get a positive Weil-Felix reaction, and inoculation of the blood of cases into monkeys or guineapigs should produce the specific typhus reaction.

In Brill's disease and in tropical typhus the reaction of Weil-Felix is in the great majority of cases positive ; 93 per cent. is the figure given by MAXCY for cases of Brill's disease in the Southern States of America. In the Australian cases it is stated that the result is "invariably positive." FLETCHER also found it positive in his cases, but not with all strains of Proteus.

In view of these results, how does the Marseilles disease compare as regards the Weil-Felix reaction? So far the results have been invariably negative. Burnet investigated the strain of Proteus employed to carry out the reaction and found that it was readily agglutinated by the serum of a case of true typhus. He also tested the serum of two cases of the Marseilles fever against his stock strain of Proteus and both gave negative results. However, some further trials made with sera taken later in the disease and with other strains of Proteus have, in the hands of LEGROUX and TEYSSONNIÈRE, given ? positive results.

Burnet criticizes these results and points out that only the cases A, B and C could by any means be considered positive, and even these cases can only be accepted with reserve. For instance, the strain "Constantinople" is agglutinated by serum B and not by A, whereas the strain H2x (Polish) is agglutinated by sera A and 6 and not by serum B ; and there are other anomalies.

Experimental inoculations.—The blood of a case of Brill's disease if inoculated intraperitoneally into a guineapig produces after an incubation period of 8–10 days the characteristic fever. So far not many attempts have been made to inoculate the blood of the cases of Marseilles fever into animals, but the few that have been carried out have all been negative.

Réactions pratiquées à Marseille (Dr. Teyssonière).

Sujets	Taux	Souches de Paris. O x 19	H2 x	H x 19	x 19 Job	x 19 Syrie	Souche Marseille	Souche de Constantinople	Souche Par
A Sérum prélevé au 3e jour de l'apyrexie	1/125	+++	+++	+++	+++	+++	+++	O	+++
	1/250	++	++	++	++	++	+	O	+ ++
	1/500	+	+	+	+	+	+	O	++
	1/1.000	±	±	±	±	±	±	O	+
B au 20e jour de la convalescence	1/125	+++	O	+++	++	±	O	+++	+++
	1/250	+++		++	±	O	O	+++	+++
	/1500	±		+	O	O	O	++	++
	1/1.000	±		O	O	O	O	+	+
C1 au 10e jour de la maladie	1/125	O	O	O	O	O	O	O	O

1. Le sérum du même malade, prélève un mois après l'entrée en convalescence n'a donné a 1/50 qu'une agglutination partielle. A considérer comme négatif.

Réactions pratiquées à Paris (Dr. Legroux)

Cas	Souches x 18 S	x 19 M	H x 19	O x 19	x 2 H
1. — 12e jour à la fin de la période d'état	O	O	O	1/50	1/50 ?
2. — 10e jour, temp. 39'.....	O	O	1/50 ?	1/50	O
3. — 12e jour	O	O	O	1/50 ?	1/50 ?
4. — Fin de la période d'état...	O	O	O	1/50 ?	1/50 ?
5. — Fin de la période d'état...	O	O	O	1/100 ?	O
6. — 1er jour d'apyrexie, 14e jour de la maladie	1/100	1/100	1/100	1/100 partiel à 1/500	1/100

Souche S provient de cas orientaux (Syrie)
" M — Europe centrale
— H — Russie (pandémie 1919)
— O — typhus de Pologne
— 24

But the authors point out that this negative response to inoculations in the guineapig is not absolute proof that the disease is not typhus, for the reason that occasionally true typhus may be inoculated into a guineapig without producing any fever (" typhus inapparent," cryptic typhus) ; but if this animal is killed and another guineapig inoculated with an emulsion of the brain, this second animal will show the typical fever curve (" typhus apparent ").

Thus if the blood of a case of fever suspected of being typhus is inoculated into a guineapig without any result, and a second guineapig is inoculated from the first again without result, typhus may be excluded.

The authors carried out experiments with the blood of the Marseilles cases and found that inoculations did not give rise to fever in animals, nor did inoculations from these animals to other animals give rise to any reaction.

Immune reactions.—Animals which have had a febrile reaction as the result of inoculation of the blood of cases of Brill's disease do not react when subsequently reinoculated with the blood of true typhus cases, and *vice versa.* But guineapigs which had been inoculated with the blood of Marseilles cases when subsequently inoculated with the blood of cases of true typhus gave the typical reaction, showing that the first inoculation had not been made with typhus blood.

In conclusion the authors say that they are not so far prepared to give a categorical " yes " or " no " to the question, Is Marseilles fever identical with Brill's disease ? Before such an answer can be given further work is necessary, and they give the following suggestions for further research.

Clinical.—A careful survey to be made of the symptoms and a comparison of these with the symptoms of typhus and Brill's disease.

Epidemiology.—Careful search for lice [MacArthur has pointed out that head lice are very apt to be overlooked]. Enquiry to be made as to the occupation of the patients—does their work bring them into contact with grain, or cattle, rats, or mice, or biting insects ?

Weil-Felix reaction.—Test sera taken after the 14th day of fever, also sera of convalescents up to several weeks after the fever has gone. The strains of Proteus used should be carefully selected, of a known titre of agglutination with typhus serum and not affected by sera of cases of other febrile conditions, such as typhoid.

Experimental inoculations.—Monkeys or guineapigs to be used in the first instance, then rats and mice. Careful estimations of the temperature of the guineapigs to be carried out for at least 20 days after inoculation. As the virus of typhus is scarce in the blood of experimental animals, it is preferable to use an emulsion of brain when inoculating one animal from another ; also, if there are fatal human cases, animals should be inoculated from these with brain emulsion. If inoculation of the blood or brain emulsion from a case of fever is negative, it is necessary to inoculate a second guineapig from the first to exclude " typhus inapparent." If the second guineapig gives a typical reaction then the case is one of typhus, but if negative then typhus can be excluded, because one never sees " typhus inapparent " in two guineapigs in series.

Immune reactions.—After an inoculation guineapigs should be retested not later than 4 to 8 weeks. If a negative result is got with the inoculation of the blood of a case of fever into a guineapig, then if this same guineapig is tested four weeks later with the blood from a case of true typhus fever, whether the result is positive or negative it proves that the first case was not typhus.

D. H.

Boinet & Pieri (Jean). Epidémies d'exanthème infectieux de nature indéterminée observées sur le littoral méditerranéen. [**Epidemics of Infectious Exanthem seen on the Mediterranean Coast.**]—*Bull. Acad. Méd.* 1927. Oct. 4. Year 91. 3rd Ser. Vol. 98. No. 31. pp. 173–182.

The authors consider that this disease belongs to the class of infectious exanthems. But it is apparently only mildly infectious, since more than one case is seldom notified in one household, and there is only one instance noted of marital infection.

The fever is met with in all social classes and, so far, neither lice, fleas nor any other vermin have been discovered on the patients and, in many cases, they could be definitely excluded. The Widal reaction is invariably negative for typhoid and no positive agglutination has been found for the meningococcus ; this last reaction has been tested because there is a quite definite meningeal type of the disease with stiffness of the neck and Kernig's sign. In these cases the examination of the cerebro-spinal fluid was also negative. The Weil-Felix reaction in all cases so far tested has been negative.

A clinical description of the cases is then given. The onset is sudden, with headache, and the temperature rises rapidly to 40° C., remains at this level with slight remissions from about the 3rd to the 10th day, and then drops slowly to normal by the 14th to the 16th day. There is considerable abdominal discomfort with diarrhoea. A marked and constant feature is sore throat. General redness of the fauces and palate is noted and occasionally small ulcers on the pillars of the tonsils. The rash appears about the 3rd day of the fever, commencing on the lower limbs and spreading up the abdomen and chest and eventually covering the face. This rash consists of rose spots at first, later becoming violet in colour ; but they are macules and not petechiae, and fade on pressure. The rash disappears about the 12th day.

Another and unique finding is a small zone of inflammation, in each case and in varying sites, and connected therewith inflamed lymph glands. These spots fade but leave a small black linear scar, to which the name " tache noire " has been given. It is suggested that they represent the site of an insect bite and are the points of entrance of the infection.

In the authors' opinion this disease is not mild typhus and they give the following reasons for arriving at that conclusion :—

1. Absence of lice.
2. Rash occurs on face and is macular, not petechial.
3. Digestive disturbances are marked.
4. No injection of conjunctiva.
5. Presence of " tache noire," which are not found in typhus.
6. Weil-Felix reaction negative.

Then follow descriptions of a series of cases.

Netter, who took part in the discussion, considered that the "tache noire " might be the site of infection and compared it to the primary ulcer found in cases of tropical typhus, and suggested that these cases also might be caused by the bite of a larval mite. But the Weil-Felix reaction is usually positive in tropical typhus.

D. H.

Castronuovo (Giovanni). Tifo eberthiano o febbre esantematica mediterranea? [**Enteric Fever or Exanthematic Mediterranean Fever?**]—*Riforma Med.* 1928. Jan. 16. Vol. 44. No. 3. pp. 50–51. [4 refs.]

The author discusses the condition which has been designated at different times " exanthematic Mediterranean fever," " Exanthematic fever of Marseilles," " Benign endemic Typhus " [? typhoid] and " Brill's disease." There are four important and fundamental characteristics of the disease : (1) The course of the fever resembles that of typhoid ; (2) the flushed face and diffuse morbilliform rash are very

like the early symptoms of typhus ; (3) Blood-culture is negative, and lice, as transmitters, are absent ; (4) the disease is mild, terminating in recovery after a course not exceeding three weeks.

He relates the case of a young woman of 20 years who, when seen at the end of the second week of high temperature, presented the following symptoms : A diffuse rash made up of very numerous rose-violet spots, very slightly raised, 4–5 mm. in diameter, some on the face, few on the trunk generally, but densely aggregated over the hips, sacrum and pubes. It was not haemorrhagic, nor pruriginous, and it persisted till the end of the attack, beginning to fade on the eighteenth day without desquamation. There was pharyngeal congestion, a furred tongue, and not much meteorism, abdominal pain or diarrhoea. The conjunctivae were hyperaemic ; there were debility, slight bronchial catarrh, pulse a little rapid, not dicrotic, tremor of the hands, insomnia and mild delirium.

The results of laboratory examinations were : Haemoculture negative (at the end of the second week) ; no agglutination by the serum with *Br. melitensis*, *Br. paramelitensis*, *Br. abortus*, *Proteus X* 19, or *B. paratyphosus A* and *B. B. typhosus* negative 1 : 50, weak positive 1 : 100, definitely positive 1 : 200–1 : 600. Recovery was rapid after the fever subsided, in three weeks from the onset.

H. Harold Scott.

KATSURADA (F.) & YOSHINO (J.). Ueber zwei Fälle des sogenannten Fünftagefiebers in Japan. [**Two Cases of So-called Five Day Fever in Japan.**]—*Abhandl. a. d. Gebiet d. Auslandskunde. Hamburg. Univ.* 1927. Vol. 26. (D., Med. & Vet. Vol. 2.) [Festschrift NOCHT.] pp. 225–228. With 2 charts in text. [2 refs.] [Inst. & Hosp. for Ship & Trop. Diseases, Kobe, Japan.]

This is the fever known in the War as Trench Fever, of which a few cases have been described from Japan. The two cases, seen in the Sessin Hospital, were married women of 19 and 53 years. The first had 9 attacks of fever, at first at intervals of 10 days, later of 5 days, lasting as a rule 20–30 hours. Nausea and vomiting, headache and malaise were present. Large doses of quinine and salvarsan were without effect. The second case was more severe. A chart shows 4 sharp rises of temperature on the 16th, 21st, 26th and 30th of March. No such bodies as Rickettsia could be found in the blood, nor in the stomach cells of lice, but almost regularly in the blood small spindle-shaped bodies like the sporozoits of malarial plasmodia. Similar bodies were seen in inoculated guineapigs, rabbits, rats, dogs and pigeons. [In the conclusions these bodies are mentioned only in respect of rabbits.] The authors suggest that the causative agent should be looked for at an early stage of the infection.

A. G. B.

MACKENZIE (Louis H. L.). **Notes on Two Cases of Undiagnosed Fever.**—*Indian Med. Gaz.* 1927. Dec. Vol. 62. No. 12. pp. 699–700.

Case 1. A boy, aged 42 years, son of a British officer in the Gilgit Agency. The fever commenced suddenly on May 26th and on the following day a well marked petechial rash appeared, particularly on the forearms and legs, slightly only on face and chest. The child complained of pains in the limbs. On May 29th the rash was much more pronounced, especially on the face ; and there were some dark red blotches. On June 2nd it began to fade, with some brawny desquamation. No Koplik's spots ; convalescence rapid.

Case 2. Father of above on June 6th developed a similar fever, with rash, but not so marked. Yet the rash took 14 days to disappear.

Diagnosis.—Measles and chicken-pox were considered and ruled out on clinical and epidemiological grounds. Typhus was suggested ; no history of tick bites could be obtained. There is no note of Weil-Felix reaction or presence of lice.

A native servant of the above went to his own village and 15 similar cases were recorded there with 8 deaths.

D. Harvey.

Cawston (F. G.). Aspects of Dengue Fever Prevention.—*Jl. Trop. Med. & Hyg.* 1927. July 1. Vol. 30. No. 13. pp. 171–172.

Mazzolani (D.). Epidemia di febbre dengue a Tripoli (Anno 1926).—*Riforma Med.* 1928. Apr. 23. Vol. 44. No. 17. pp. 489–493. [37 refs.]

JAPANESE RIVER FEVER.

Lewthwaite (R.). **Japanese River Fever.**—*Malayan Med. Jl.* 1927. Dec. Vol. 2. No. 4. pp. 145–148.

This is a résumé of a lecture delivered to the Klang Branch of the Incorporated Society of Planters on September 19th, 1927, and the subject was chosen because of the occurrence in Selangor of 4 cases of the disease. These 4 cases have already been described by Fletcher of the Kuala Lumpur Institute for Medical Research [*ante*, p. 52].

The disease resembles the so-called tropical typhus except for the well-marked primary ulcer and the enlarged glands in the vicinity. This ulcer is the site of the bite of the six-legged larva of the red mite *Trombicula akamushi*. In the nymphal and adult stage the mite does not bite warm-blooded animals, preferring vegetable juices ; but the larvae bred from these adults can be shown to be infective—that is, although the adults do not convey infection to man, they can and do pass it on hereditarily to the ova and larvae.

It has been shown that the natural host of this mite is the rat : as many as 100 have been found on one rat, usually on the inside of the ear. Similar mites have been found on certain birds, and it is possible that the disease may be carried in this manner from one district to another.

Prevention lies in extermination of rats and avoidance of bites by larvae by bathing and change of clothes.

D. Harvey.

van Driel (B. M.). Een merkwaardig geval van mijtekoorts. [**A Remarkable Case of "Mite Fever."**]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1927. Vol. 67. No. 5. pp. 667–674. With 1 chart in text.

Mite fever is a name coined by the author to indicate the disease, discovered by Schüffner in N.E. Sumatra and described by him under the name of "pseudotyphus." He was well aware of the close relation with the "Tsutsugamushi" and suspected the existence of acarid transmitters. Walch afterwards described a number of Trombiculae,

some of which were shown to be the probable vectors of the disease. The article under review describes a case in a Javanese coolie conspicuous by the appearance (during the 2nd week of illness) of serious disturbance of the brain, rhythmic spasms in the muscles of the face and the extremities, resembling an acute attack of paralysis agitans and lasting for about a week. This disturbance was accompanied by an inflammation of a portion of the uvea of both eyes resembling neuroretinitis specifica. The patient recovered almost completely within 3 weeks.

N. H. Swellengrebel.

Erratum.

No. 1. p. 52. Fletcher & Field (Tsutsugamushi Disease in F.M.S.) line 4 of abstract, for 1925 read 1915. [Dowden's paper was noticed in this *Bulletin*, Vol. 6, p. 316.]

YELLOW FEVER.

STOKES (Adrian), BAUER (J. H.) & HUDSON (N. Paul). **The Transmission of Yellow Fever to *Macacus rhesus*: Preliminary Note.**—*Jl. Amer. Med. Assoc.* 1928. Jan. 28. Vol. 90. No. 4. pp. 253–254.

This is the first account of studies on yellow fever carried out by the West African Yellow Fever Commission of the Rockefeller Foundation and contains the first definite record of the transmission of this disease to monkeys.

During an epidemic at Larteh, Gold Coast, six Indian crown monkeys (*Macacus sinicus*) were inoculated with blood from patients suffering from yellow fever. Five of these developed fever and died, and the other showed no sign of infection. Subinoculations were made into three other monkeys of the same species, and two developed fever from which they recovered, and the third was refractory.

Later experiments were made with *Macacus rhesus* and this species was found to be very susceptible to the infection. One animal inoculated with blood from a mild case died after 5 days. Subinoculations also proved positive, and this strain has been carried from monkey to monkey by the inoculation of blood or serum thirty times, with fatal infections in every case except one, when the animal recovered. In addition, 22 monkeys were infected by transmitting the disease from one animal to another by the bites of *Aëdes aegypti*.

These mosquitoes invariably became infective when fed on infected monkeys on the first or second day of the fever. The minimum incubation period has not been determined, but mosquitoes are certainly infective on the 16th day and remain so until death. One mosquito produced a fatal infection in two monkeys 85 and 91 days respectively after it had been infected by feeding.

In one experiment the virus was not transmitted to the offspring of infected mosquitoes.

The serum of infected monkeys filtered through V and N grades of Berkefeld filters and also through the Seitz asbestos filter produced fatal infections.

0·1 cc. of convalescent serum from a patient who suffered from a severe attack of yellow fever, protected monkeys against fatal doses of infected blood and also against the bites of infected mosquitoes.

The course of the disease in monkeys generally consists of an incubation period of 2–6 days and fever of from 104°–105° F. for 1–5 days, followed by collapse and death. During the febrile period bile, albumin, and granular and hyaline casts appeared in the urine and finally bile was present in the serum. Spontaneous bleeding of the gums was seen occasionally.

The pathological changes observed in infected monkeys agree with those occurring in human cases of yellow fever. Cultures of the blood in various media, including those for leptospira, have been uniformly negative and no leptospira have yet been observed in any of the tissues of infected monkeys.

Two other strains of yellow fever from Europeans who died from the disease were transmitted to monkeys and one of these has also been transmitted by means of mosquitoes.

[This important paper acquired a tragic interest, for one of the authors, Dr. Adrian Stokes, fell a victim to the disease during the

course of these investigations. Although THOMAS, in Brazil, recorded the production of febrile symptoms in rhesus monkeys (and guineapigs) by inoculating the blood of yellow fever patients, it seems doubtful, in view of the fatal nature of the infection in this animal, whether these symptoms were really due to the disease in question. The paper reviewed above establishes beyond all doubt the extreme susceptibility of *Macacus rhesus*, and will be of great value in future work on the aetiology of yellow fever.]

E. Hindle.

STOKES (Adrian), BAUER (Johannes H.) & HUDSON (N. Paul). **Experimental Transmission of Yellow Fever to Laboratory Animals.**—*Amer. Jl. Trop. Med.* 1928. Mar. Vol. 8. No. 2. pp. 103–164. With 28 figs. [4 refs.]

This article is mainly an extension, including full details of experiments, of the paper reviewed above. Further experiments confirm the results showing the extreme susceptibility of *Macacus rhesus* to yellow fever. *M. sinicus* is also susceptible, but to a less degree, whilst chimpanzees, all local monkeys and guineapigs were completely refractory. Filtration experiments showed that the virus in the blood will pass through Berkefeld filters V and N, but not through a Berkefeld W filter. On the other hand the virus in the mosquito, obtained by making emulsions of the infected insects, will not pass through any of these filters. Convalescent serum in doses of 0·1 cc. protected monkeys against infection, whilst anti-*icteroides* serum in doses of 5 and 10 cc. failed to protect monkeys in any way when infected with the disease, transmitted either by mosquito bite or by the inoculation of infected blood.

E. H.

MATHIS (C.), SELLARDS (A. W.) & LAIGRET (J.). Sensibilité du *Macacus rhesus* au virus de la fièvre jaune. [**Susceptibility of** *M. rhesus* **to Yellow Fever Virus.**]—*C.R. Acad. Sci.* 1928. Feb. 27. Vol. 186. No. 9. pp. 604–606. [3 refs.]

The authors describe an interesting case of the successful transmission of yellow fever to *Macacus rhesus* by means of the bites of infected Stegomyia, and also by the inoculation of the blood of an infected patient at Dakar, Senegal.

The patient, a Syrian 17 years old, had a mild attack of yellow fever, with slight jaundice and only traces of albumen in the urine. Sixteen mosquitoes were fed on this patient 20 hours after he first showed fever; at the same time a monkey was inoculated with 4 cc. of his blood. Two days later this animal showed a slight fever and was found dead on the 8th day after inoculation. The autopsy showed the presence of slight jaundice and lesions resembling those of yellow fever. Subinoculations into guineapigs were negative.

Twenty-four days after feeding on the patient, 11 of the mosquitoes were fed on a monkey. After 3 days incubation period this animal had a sharp rise in temperature, which continued for two days, and death occurred during the night of the fifth day. The autopsy showed the presence of slight jaundice of the subcutaneous fat and fatty degeneration of the liver. The urine contained albumen.

The same lot of infected mosquitoes were fed on a second monkey, 31 days after the infective feed. After only 60 hours this animal

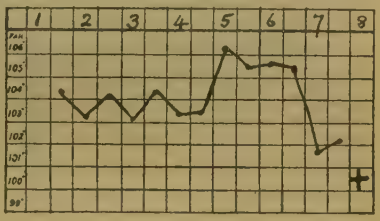
showed a sharp rise in temperature and died on the fifth day. There was no appreciable jaundice, but haemoglobin was present in the stomach and the liver showed signs of fatty degeneration.

[This paper is the first independent confirmation of the important fact discovered by STOKES (see above) that yellow fever is communicable to *Macacus rhesus*, and emphasizes the necessity of getting patients at the commencement of the disease in order to be sure of obtaining the virus.]

E. .H

SELLARDS (A. W.) & HINDLE (Edward). **The Preservation of Yellow Fever Virus.**—*Brit. Med. Jl.* 1928. Apr. 28. pp. 713–714. With 2 text figs. [4 refs.] [Wellcome Bureau of Scientific Research, London.]

A virus isolated from a case of yellow fever at Dakar by direct inoculation of monkeys with the blood of the patient and by the feeding of mosquitoes (see paper by MATHIS, SELLARDS & LAIGRET reviewed above) was maintained in monkeys for about 3 months. On his return to Europe one of the authors brought with him the frozen liver



Temperature chart of rhesus monkey inoculated with a suspension of frozen liver from a case of yellow fever. The animal was found dead on the morning of the eighth day.

[Reproduced from the *British Medical Journal*.]

and blood removed from a monkey at the height of the infection. The liver and blood had been frozen immediately after removal from the body and had been kept in this condition for 12 days during the journey to London. On arrival, the authors inoculated monkeys with the liver and blood. The one inoculated with the liver contracted the disease as evidenced by the characteristic temperature chart, the jaundice and the appearances at the post-mortem which was performed on the seventh day when the animal died. It is evident that the virus will withstand freezing for at least 12 days.

C. M. Wenyon.

HINDLE (Edward). **A Yellow Fever Vaccine.**—*Brit. Med. Jl.* 1928. June 9. pp. 976–977. [5 refs.] [Wellcome Bureau of Scientific Research, Endsleigh Gardens, London.]

With the virus of yellow fever referred to in the paper reviewed above (SELLARDS & HINDLE) the author has prepared what appears to be a potent vaccine. The virus has been maintained in rhesus monkeys by inoculation of liver material from animal to animal, a dose of 0.0001 grams being sufficient to produce death in four or five days. Working on the lines adopted for the preparation of vaccines in fowl plague, dog distemper and foot-and-mouth disease, vaccines

were prepared from the liver and spleen of yellow fever monkeys. Two types of vaccine were prepared, one with formalin and the other with carbolic acid. The formalin vaccine was prepared by grinding up with broken glass the liver and spleen of a monkey which had died of the disease, mixing the resulting paste with five times its weight of normal saline solution and adding sufficient formalin to make a 1 in 1,000 strength of formaldehyde. The mixture, filtered through muslin, was kept in the ice chest at 0° to —3° C. To one monkey 1 cc. of the vaccine was given subcutaneously on April 19th, 1928. Having shown nothing but a rise of temperature of 2 to 3 degrees on the fourth and fifth days it was inoculated subcutaneously on April 27th, 1928 with 0·2 gm. of infected liver. After an incubation period of 3 days there developed a mild attack of yellow fever lasting for 4 days. This was followed by a fall of temperature to the subnormal and recovery. Two control monkeys inoculated with 0·001 gm. and 0·0001 gm. of liver respectively died of typical yellow fever. The vaccinated monkey was again inoculated on May 5th, 1928, with approximately 1 gm. of liver and again showed nothing more than a slight febrile reaction.

The phenol glycerine vaccine was prepared as follows. The liver and spleen were cut into small pieces and washed well with normal saline solution. These were then ground up into a paste to which was added four times its weight of the following mixture—glycerine 600 cc., 5 per cent. phenol 100 cc., distilled water 300 cc. The mixture was filtered through muslin, kept at room temperature for a week and then placed in the ice chest. This vaccine has been tested on seven monkeys. The first was given subcutaneously 1 cc. of vaccine on April 19th, 1928, and as in the case of the monkey which had received the formalized vaccine it was inoculated subcutaneously on April 27th, 1928, with 0·2 gm. of infective liver. It showed no reaction and six days later was injected with 1 gm., and again on May 24th, 1928 with 1 gm. of infective liver. It withstood all these inoculations of virulent material and has remained in perfect health. The carbolized vaccine having given such a striking result it was decided to try t on a larger scale. On May 15th, 1928, six rhesus monkeys were given subcutaneously 1 cc. of the same vaccine which had then been kept on ice for four weeks. There was no febrile reaction, as shown by temperatures taken morning and evening. On May 24th, 1928, the six monkeys and four controls received subcutaneously approximately 1 gm. of infected liver with the exception of one of the vaccinated monkeys which had about 2 gm. All the control monkeys died in 4 to 5 days with typical symptoms. The vaccinated monkey which received the large dose of virus also died of yellow fever, but the other five remained uninfected. In view of the relatively enormous dose of virus administered it is clear that the method of protection by carbolized vaccine affords a simple means of protecting rhesus monkeys against yellow fever infection, a means which the author points out is likely to be applicable to human beings.

C. M. Wenyon.

Selwyn-Clarke (P. S.). **Report on Yellow Fever in Accra March-June, 1927.—Gold Coast. XXVII.—1927-28.**—29 pp. With 3 folding maps & 1 folding chart. 1928. Accra. [2s.]

An interesting account of the yellow fever outbreak in Accra in March to June, 1927, including a brief history of previous epidemics.

From 1910 up to the outbreak in question there have been a total of 323 cases of the disease with 155 deaths, but probably very many unrecognized cases occurred and in 1926 at Asamankese alone, the Rockefeller Commission estimated the number at over 1,000 cases and 100 deaths.

The racial distribution of the case mortality shows 112 Europeans, with 84 deaths; 204 Africans, with 64 deaths; and 7 Syrians with 7 deaths. Cases were practically never recognized in children under 5 years of age, and the greater proportion occurred in young and middle-aged adults. With regard to the last epidemic the great majority of cases occurred in Africans, who had previously been regarded to a large extent as being immune to the disease.

The first recognized case in 1927 occurred in a Syrian. [In the recent Senegal outbreak the first cases recognized were also Syrians, and it would seem that members of this race should be carefully watched when the presence of yellow fever is suspected.]

The history of the outbreak is described in detail and there is little doubt that it was introduced from one of the infected districts a few miles from Accra. The clinical symptoms of some of the cases are dealt with and the author insists on the difficulty of recognizing the disease in the early stages. From a consideration of the African cases it is suggested that there is a certain degree of local racial immunity, but there seems to be less resistance in natives from inland areas.

The report contains a list of administrative provisions and preventive measures which are mainly concerned with anti-mosquito measures, and the isolation of patients and contacts. After the evacuation of Europeans and Syrians from the African township to the European residential area, no more cases occurred amongst them, and it would seem that contact of Europeans with the native population favours the spread of the disease. Amongst the recommendations special attention may be directed to the importance of segregating the native populations of towns which include European and Syrian inhabitants.

E. H.

Young (W. A.). **Yellow Fever and Relapsing Fever. A Comparison.**—*West African Med. Jl.* Lagos. 1927. July. Vol. 1. No. 1. pp. 4–6.

A useful comparison of the two diseases giving a summary of methods of distinguishing them by post-mortem appearances, including histology, and a differential diagnostic table which is reproduced herewith :—

Differential Diagnostic Table.

Clinical.	
Relapsing Fever (lice-borne).	Yellow Fever.
Prostration.	
Not so marked.	Very marked.
Tongue.	
Moist with brown coat and with occasional black-streaked dorsum.	Small, pointed, bright red edges and tip, with red papillae showing through. Dorsum white coated.
Jaundice.	
If present is of a golden yellow colour.	Is present by the third day and may be as early as the first day. Distinct tinge of green in the yellow.

Urine.

Albumen slight to very moderate amount is usually present, also an occasional granular cast. No suppression.	Albumen present by 2nd or 3rd day. If earlier, prognosis very bad. Soon becomes abundant, from 1/6 to a solid tube-full when urine is boiled and acetic acid added. Yellow granular cast abundant. Blood on rare occasions. Suppression common.

Black Vomit.

As a symptom more often absent than present.	Usually present at some stage of the disease. If not seen in life is always found post-mortem.

Spironemata.

Easily demonstrable by dark field microscope and confirmed in stained blood film.	No organism yet demonstrated.

Lice.

Always present.	Usually absent and need not be present.

HISTOLOGICAL.

Liver.

Only individual cells or small foci necrosed here and there.	Zonal necrosis usually well marked.
Eosinophilic liver cells absent.	Eosinophilic liver cells present.
Congestion marked.	Congestion slight (occasional exceptions).
Haemorrhages few or nil.	Haemorrhages numerous.
Fatty degeneration slight.	Fatty degeneration marked.
Spirochaetes numerous.	Spirochaetes absent.

Kidney.

Cloudy and granular changes in the cells.	Severe parenchymatous nephritis.
Casts scanty or nil.	Casts numerous, including lime-casts.
Haemorrhages usually nil.	Haemorrhages frequent.
Fat practically nil.	Fat present.
Spirochaetes numerous.	Spirochaetes absent.

Heart.

Fat slight (unless in an acute toxic case, when it may be abundant).	Fat present, usually in quantity, as fine minute droplets.

E. H.

STRATHAIRN (G. C.). **A Case of Phosphorus Poisoning reported as a Possible Case of Yellow Fever. Abstract of a Communication.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1928. Mar. 31. Vol. 21. No. 6. pp. 491–493. With 1 chart in text.

The description of the clinical symptoms, and results of post-mortem examination of a case of phosphorus poisoning in Jamaica, which in many respects closely resembled yellow fever.

E. H.

HOFFMANN (W. H.). **The Anatomical Diagnosis of Yellow Fever.**—*Jl. Trop. Med. & Hyg.* 1928. Jan. 2. Vol. 31. No. 1. pp. 1–4.

The author, who has had considerable experience in Havana, emphasizes the importance of pathological histology for the diagnosis of yellow fever, since it is the only satisfactory method of identifying cases of the disease. He also remarks "I have examined a sufficient number of African cases to state that the lesions of the West African yellow fever are histologically identical with the classical lesions of the American epidemics, of which I previously had the opportunity of making a detailed study." A useful summary is given of the histological lesions observed in cases of the disease and methods of distinguishing it from other affections such as Weil's disease.

E. H.

SNIJDERS (E. P.). Zur pathologischen Anatomie der Leber bei Gelbfieber und Weilscher Krankheit. [**The Pathological Anatomy of the Liver in Yellow Fever and Weil's Disease.**]—*Abhandl. a. d. Gebiet d. Auslandskunde. Hamburg. Univ.* 1927. Vol. 26. (D., Med. & Vet. Vol. 2). [Festschrift NOCHT.] pp. 539–541. [14 refs.]

The author was unable to find any difference in the pathological anatomy of guineapigs infected with *L. icterohaemorrhagiae* and those infected with two strains of *L. icteroides*, whereas the livers of yellow fever cases are distinct from those of Weil's disease.

E. H.

SELLARDS (Andrew Watson) & THEILER (Max). **Pfeiffer Reaction and Protection Tests in Leptospiral Jaundice (Weil's Disease) with** *Leptospira icterohaemorrhagiae* **and** *Leptospira icteroides*.—*Amer. Jl. Trop. Med.* 1927. Nov. Vol. 7. No. 6. pp. 369–381. [8 refs.] [Harvard Med. Sch., Boston, Mass.]

The authors made careful experiments with the serum of five patients, from four widely separated sources, and one guineapig after recovery from leptospiral jaundice (Weil's disease). All these six immune sera gave positive Pfeiffer reactions and protected guineapigs against *L. icterohemorrhagiae* and a pathogenic strain of *L. icteroides* from Palmeiras, Brazil; moreover, titrations showed that they were essentially equal in their effects on these two strains. Consequently, *L. icteroides* must be regarded as a synonym of *L. icterohemorrhagiae*.

In support of the rodent origin of leptospiral jaundice in man, it was found that the serum of patients protected guineapigs against a strain of *L. icterohemorrhagiae* isolated direct from rats.

Finally, the authors state that "If the serum of a patient convalescent from an attack of acute infectious jaundice gives positive Pfeiffer reactions with protection of guineapigs against either *L. icterohaemorrhagiae* or *L. icteroides*, the diagnosis of leptospiral jaundice (Weil's disease) is justified. Negative reactions are consistent with the diagnosis of yellow fever."

E. H.

DE VOGEL (W.). La parenté, sinon l'identité, du *Leptospira icterohaemorragiae* et du *Leptospira icteroides* de Noguchi. [**Affinity if not Identity, of** *L. icterohaemorrhagiae* **and** *L. icteroides*.]—*Bull. Office Internat. d' Hyg. Publique.* 1927. Dec. Vol. 19. No. 12. pp. 1814–1826.

An interesting summary of recent observations on diseases caused by Leptospira, and also remarks on yellow fever. The author suggests that the reason *Aëdes aegypti* only becomes infective several days after an infective meal, may be scarcity of parasites in the blood of the patient and that the causative organism of yellow fever may be more abundant in the blood before the onset of the fever.

[Dr. Beeuwkes' name is incorrectly spelt " Becuskos "].

E. H.

SCHÜFFNER (W.), MOCHTAR (Achmad), PROEHOEMAN (Sjoeib) & HONIG (L.). Weitere Beiträge zur Aetiologie des Gelbfiebers und der Bedeutung der *Leptospira icteroides* Noguchi. [**Further Investigations on the Aetiology of Yellow Fever and the Nature of** *Leptospira icteroides* **Noguchi.**]—*Abhandl. a. d. Gebiet d. Auslandskunde. Hamburg. Univ.* 1927. Vol. 26. (D., Med & Vet. Vol. 2.) [Festschrift NOCHT.] pp. 500–506. [6 refs.] [Trop. Hyg. Inst., Amsterdam.]

The authors compared three strains of *L. icteroides*, Le Blanc, Merida and Bahia, with a typical Weil's disease, and also with a rat strain of Leptospira, from Sumatra, and *L. hebdomadis*.

Agglutination and lysis reactions and also cross immunity showed that the strains of *L. icteroides* were identical with typical *L. icterohaemorrhagiae*.

Aëdes aegypti were fed on guineapigs infected with *L. icteroides* (Le Blanc strain) and subsequently on normal animals after intervals of 2 to 21 days with entirely negative results. The Leptospira, however, was capable of living in the gut of the mosquito up to the fourth day, as proved by inoculation experiments.

As a result of their experiments the authors come to the conclusion that *L. icteroides* and *L. icterohaemorrhagiae* are identical, and that the aetiology of yellow fever is still unknown.

E. H.

BRUYNOGHE (R.) & CORNIL (J.). La parenté du *Leptospira icteroides* et du *Leptospira icterohaemorrhagiae*. [**Relationship of** *L. icteroides* **and** *L. icterohaemorrhagiae*.]—*C.R. Soc. Biol.* 1928. Mar. 2. Vol. 98. No. 8. pp. 598–600. [3 refs.] [Bact. Lab., Univ. Louvain.]

The authors have made a number of serological comparisons between a typical strain of *Leptospira icterohaemorrhagiae*, and the Palmeiras strain of *L. icteroides*, and a water leptospira.

"The results establish the biological identity of *Leptospira icteroides* and *L. icterohaemorrhagiae* and in view of the clinical differences between Weil's disease and yellow fever, we are compelled to believe that the specific agent of this latter infection is still unknown."

[This paper confirms the now generally accepted view that *Leptospira icteroides* is identical with *L. icterohaemorrhagiae*, and bears no relation to the cause of yellow fever.]

E. H.

MARTINI (Erich). **A Comparison of the Spirochete of Yellow Fever (*Leptospira icteroides* Noguchi) with the Leptospira of Weil's Disease.**—*Jl. Experim. Med.* 1928. Feb. 1. Vol. 47. No. 2. pp. 255–260. [Hygienic Lab. of Samper and Martinez, Bogota, Colombia, S. America.]

——. Ueber die Geibfieberleptospira (*Leptospira icteroides* Noguchi) im Vergleich zur Leptospira der weilschen Krankheit (synonym *Spirochaeta icterogenes* Uhlenhuth und Fromme, *Spirochaeta nodosa* Huebner und Reiter, *Spirochaeta icterohaemorrhagiae* Inada, Ido, Hoki, Kaneko und Ito, Weilsche Spirochäte Ungermann und Zuelzer.—*Cent. f. Bakt.* I. Abt. Orig. 1928. Feb. 15. Vol. 105. No. 6-8. pp. 402–407 [Samper & Martinez Hyg. Labs., Bogota, Colombia.]

The main interest of this paper lies in the observations on the extraordinary duration of life and relatively meagre food requirements of *Leptospira icteroides*. Cultures made in a mixture of one part inactivated rabbit serum and three parts saline, survived more than 3½ years, whilst cultures of a strain of *L. icterohaemorrhagiae* only lived for about six months under the same conditions.

If the blood containing leptospirae was merely mixed with physiological salt solution, the latter strain lived for more than 11 months whilst *L. icteroides* died out after 6½ months.

[No definite conclusions as to the relation of these two strains can be drawn from these experiments, and the author's suggestion that the yellow fever organism might survive saprophytically in water because of the behaviour of *L. icteroides*, are negatived by the doubtful nature of this organism.]

E. H.

MATHIS (C.), CAZANOVE (F.) & BACQUÉ (M.). Inoculation de sang et d'urine de jauneux à des cobayes. [**Inoculation to Guineapigs of Blood and Urine from Yellow Fever Cases.**]—*Bull. Soc. Path. Exot.* 1927. Dec. 14. Vol. 20. No. 10. pp. 1025–1038. With 8 charts. [Pasteur Inst., Dakar, Senegal.]

The blood of seven yellow fever patients at Dakar, collected respectively on the second, third, fourth and sixth days of the disease, was inoculated into 19 guineapigs, and in addition two guineapigs were inoculated with urine from a case, with entirely negative results. Moreover, the authors never observed Leptospira in the blood of the patients or in any of the guineapigs.

E. H.

SAWYER (W. A.) & BAUER (J. H.). **Survival of *Leptospira icteroides* in Various Environments.**—*Amer. Jl. Trop. Med.* 1928. Jan. Vol. 8. No. 1. pp. 17–28. [1 ref.]

Cultures of various strains of *L. icteroides* and *L. icterohaemorrhagiae* and a water Leptospira, were mixed with stagnant water and kept in the dark at room temperature. After various intervals the water was filtered through Berkefeld cylinders V and N and the filtrate cultured for leptospirae. The first two survived 55 days and the water leptospira at least 115 days in stagnant water.

L. icteroides was recovered in pure culture from faeces freshly inoculated with this organism, but died out in the faeces within a few hours. Large numbers of leptospirae were observed in the urine of two out of twelve guineapigs that died from infection with *L. icteroides*, but the organism could not be recovered from urine mixed with cultures, probably owing to the presence of the urine preventing growth.

Mosquitoes (*Aëdes aegypti*) were fed on heavily infected guineapigs and pure cultures of *L. icteroides* obtained from these insects nine hours after feeding, but not later.

E. H.

PITTALUGA (Gustavo). El problema de la fiebre amarilla. [**The Yellow Fever Problem.**]—*Siglo Méd.* 1928. Mar. 3. Year 75. Vol. 81. No. 3873. pp. 211–229. With 2 maps in text. [3 refs.]

The author gives a good general account of the unsolved problem of yellow fever and of the doubts to which recent research has given rise. He compares yellow fever with infective jaundice due to *L. icterohaemorrhagiae* and with dengue, and, recognizing that *L. icteroides* can no longer be regarded as the cause of yellow fever, he concludes, as is inevitable, that vaccines prepared from this (hypothetical) organism cannot confer prophylactic immunity.

A brief record is presented of the prevalence of yellow fever on the West coast of Africa in the five years 1921–5, during which 106 Europeans were attacked, 46 of them on the Gold Coast and 25 in Lagos. In Senegal there was an outbreak, beginning in October 1926, the disease being brought by a caravan of Syrians. In the ensuing three months 16 Syrians and 18 Europeans fell victims and of these 29 died.

H. Harold Scott.

AUDIBERT. La fièvre jaune en Afrique Occidentale Francaise en 1926–1927. [**Yellow Fever in French West Africa, 1926-27.**]—*Bull. Office Internat. d' Hyg. Publique.* 1927. Dec. Vol. 19. No. 12. pp. 1805–1813. With 1 map. [3 refs.]

A history of cases of yellow fever occurring in the French West African colonies during 1926 and 1927. In the first year, Senegal had 53 cases with 41 deaths, but of these, 25 cases including 23 deaths were among Syrians who only constitute one-ninth of the total white population. The Syrians, however, live in close contact with the natives and do not observe the most ordinary prophylactic measures, such as using a mosquito net, and consequently are commonly the first to become infected. The author points out that the incidence of yellow fever cases in the West Coast of Africa proves the existence of an endemic centre for the disease, as it is obviously not being introduced from South America.

With reference to the 1927 epidemic in Senegal, there were 151 cases with 104 deaths in six months, but the author remarks that this is only 1·5 per cent. of the total white population. It is stated that a Commission to study the disease has been formed by the Pasteur Institute

in Paris, and is going out to Dakar under the direction of Professor Pettit. Up to the present all attempts in Senegal to find *L. icteroides* in cases of yellow fever have been negative, and the use of the vaccine made with this organism is considered of very doubtful value.

E. H.

Schüffner (W.). Neuere Untersuchungen ueber die Aetiologie des Gelbfiebers. Die Identität der *Leptospira icteroides* und der *Leptospira icterohämorrhagiae* (syn. *icterogenes*). [**New Work on the Etiology of Yellow Fever.**]—*Muench. Med. Woch.* 1928. Apr. 20. Vol. 75. No. 16. pp. 682–683. [Trop. Hyg. Inst., Colonial Inst., Amsterdam.]

A useful review of the recent experiments which have proved the identity of *Leptospira icteroides* and *L. icterohaemorrhagiae* and led to the conclusion that yellow fever is not a leptospiral disease.

E. H.

Hoffmann (W. H.). Die stille Feiung beim Gelbfieber. [**Immunity without Previous Symptoms of Illness in Yellow Fever.**]—*Muench. Med. Woch.* 1928. Apr. 13. Vol. 75. No. 15. pp. 649–650. [Finlay Lab., Health Ministry, Havana.]

An account of the view that yellow fever is maintained in endemic centres by the infants becoming infected without showing any obvious symptoms of the disease.

E. H.

Rigollet (S.). A propos de la prophylaxie de la fièvre jaune à la côte occidentale d'Afrique. [**Yellow Fever Prophylaxis on the West Coast of Africa.**]—*Bull. Soc. Path. Exot.* 1927. Nov. 9. Vol. 20. No. 9. pp. 858–865.

An account of prophylaxis against yellow fever in West Africa with special reference to Dakar.

E. H.

Bulletin de la Société de Pathologie Exotique. 1927. Nov. 9. Vol. 20. No. 9. pp. 833–838. [1 ref.]—Prophylaxie de la fièvre jaune. [**Yellow Fever Prophylaxis.**]

A useful summary of prophylactic measures against yellow fever recommended to the French Colonial Secretary by a Commission composed of Messrs. Bouffard, Joyeux, Leger, Rigollet, Roubaud and Salimbeni, with Marchoux as president.

E. H.

Remlinger. La protection du Maroc contre la fièvre jaune. [**Protection of Morocco against Yellow Fever.**]—*Bull. Acad. Méd.* 1927. Nov. 22. Year 91. 3rd Ser. Vol. 98. No. 38. pp. 435–443. [15 refs.]

A paper drawing attention to the curious fact that no cases of yellow fever have yet been recorded from Morocco, although the countries both north and south have suffered from epidemics. Moreover *Stegomyia fasciata* is extremely abundant in the country and the climatic conditions are favourable to the spread of the disease. The author discusses the reason for this freedom from infection, which is probably due to the political isolation of the country until recent times. At present the greatest chance of the disease being introduced seems to be

by boat from Senegal, although the possibility of other methods, such as by aeroplane, are also considered. Finally the author advocates the adoption of certain prophylactic measures in order to avoid the possibility of yellow fever being introduced.

E. H.

PERYASSU (Antonio Gonçalves). Prophylaxia da febre amarella no Brazil. [**Prophylaxis against Yellow Fever in Brazil.**]—*Archivos de Hyg.* Rio de Janeiro. 1927. Sept. Vol. 1. No. 2. pp. 49–86. With 11 plates (2 maps). With English summary.

The first part is an account of the history of yellow fever from its introduction into Brazil, from the West Indies in 1685, down to the present time. The author then gives details of an outbreak of this disease during 1926 in Pirapora, a town of 5,000 inhabitants in the state of Minas Geraes. During the epidemic there were 45 cases of yellow fever of which 18 died. Although this town is small there is considerable traffic through it, both by river and railway, and it is rather remarkable that up to this outbreak no cases of the disease had been found. The 1926 epidemic was attributed to the presence of large numbers of troops, some of whom came from the states of Pernambuco and Parahyba, where the disease is said to be not yet exterminated, and spread the infection along the valley of the river San Francisco.

The author states that in the interior of Bahia, Minas, and North-eastern Brazil, there are several regions presenting groups of small villages or towns totalling fifty to two hundred thousand inhabitants, where the disease is endemic and affects the young children in a mild form.

The only method of eradicating yellow fever is to destroy every breeding place for mosquitoes, and even when the larval index falls to 2 per cent. anti-larval measures should be carried on for another two years.

E. H.

BOUDREAU. Pourquoi laisse-t-on évoluer la fièvre jaune ? [**Prevention of Yellow Fever.**]—*Jl. Méd. de Bordeaux.* 1927. Dec. 10. Vol. 104. No. 23. pp. 913–917.

An article advocating the use of iodine as a universal prophylactic against all parasitic diseases, including yellow fever, and also for treatment. No experimental details are given.

E. H.

SELLARDS (A. W.). La lutte contre la fièvre jaune. [**The Fight against Yellow Fever.**]—*Bull. Soc. Path. Exot.* 1928. Jan. 11. Vol. 21. No. 1. pp. 70–73. [4 refs.]

A useful account of the evidence supporting the author's conclusions that *Leptospira icteroides* and *L. icterohaemorrhagiae* are identical; that *L. icteroides* is not transmitted by the mosquito; and that it has no causal relation whatever with yellow fever.

In view of the conditions in West Africa the author insists on the urgent necessity of discovering some method of preventive vaccination in addition to carrying on anti-mosquito campaigns.

E. H.

HOFFMANN (W. H.). Die Schutzimpfung gegen das Gelbfieber in Westafrika. [**Protective Inoculation against Yellow Fever in West Africa.**] —*Klin. Woch.* 1927. Nov. 12. Vol. 6. No. 46. pp. 2191–2192. [Finlay Lab., Philippine Health Service, Habana.]

An article recommending the use of Noguchi's vaccine (*L. icteroides*) for protection against yellow fever in West Africa; also advocating the desirability of keeping supplies of the immune serum.

E. H.

RENAULT (Jules). A propos du vaccin de Noguchi contre la fièvre jaune. [**Noguchi's Vaccine and Yellow Fever.**]—*Bull. Acad. Méd.* 1927. Nov. 22. Year 91. 3rd Ser. Vol. 98. No. 38. p. 434.

An official letter from the French Colonial Secretary to the Academy of Medicine asking their opinion of the value of NOGUCHI'S vaccine. The reply indicates that although its value is disputed, the use of the vaccine does no harm, so could be given if requested, but that anti-mosquito campaigns remain the only certain method of combating the disease.

E. H.

HOFFMANN (W. H.). Ueber das vorkommen der Gelbfiebermuecke in Niederlaendisch Indien. [**The Possibility of Yellow Fever in the Dutch East Indies.**]—*Meded. Dienst d. Volksgezondheid in Nederl-Indië.* 1928. Vol. 17. Pt. 1. pp. 182–183. [Finlay Lab. Dept. of Health, Havana.]

BRUG (S. L.). **Remarks to the Previous Paper of Prof. Dr. W. H. Hoffmann.** — *Ibid.* pp. 184–185. [Med. Lab. Weltevreden, Java.]

The first paper contains records of crossing two strains of *Aëdes aegypti*, one from Cuba and the other from the Dutch East Indies. No differences whatever were observed in the fertility of the offspring of these crosses, carried through four generations, and moreover the two were morphologically identical.

Consequently there is no support for the view [*ante*, p. 274] that Asia has remained free from yellow fever because it has a different race of *Aëdes aegypti* from that in America.

The second paper is a record of similar experiments carried out in Java, entirely confirming the results obtained in Cuba.

E. H.

DA FONSECA, Filho (Olympio). Estado actual da questao da etiologia da febre amarella.—*Folha Med.* 1928. Jan. 15. Vol. 9. No. 2. pp. 17–18.

HOFFMANN (W. H.). La fiebre amarilla africana.—*Sciencia Med.* 1927. Dec. Vol. 5. No. 12. pp. 671–673. [Finlay Lab. Havana.]

HOFFMANN (W. H.). La fiebre amarilla africana.—*Rev. Méd. de Hamburgo.* 1928. Jan. No. 1. 3 pp.

MATTOS (Emygdio). Prophylaxia da febre amarella. Conferencia realizada no Curso de Hygiene e Saude Publica, cadeira de Epidemiologia e Prophylaxia Geraes, em Outubro de 1926.—*Archivos de Hyg.* Rio de Janeiro. 1927. May. Vol. 1. No. 1. pp. 95–119. With 1 plate. [2 refs.]

MALARIA.

i. Seagar. **Malaria in Barbados.**—*Trop. Agriculture.* Trinidad. 1928. Mar. Vol. 5. No. 3. pp. 48–50. With 1 plate.

ii. Balfour (Andrew). **The Infection of Barbados with Malaria.** [Correspondence.]—*Brit. Med. Jl.* 1928. Jan. 21. p. 114.

iii. Hanschell (H. M.). **The Infection of Barbados with Malaria.** [Correspondence.]—*Ibid.* Jan. 28. p. 157.

i. On October 8th, 1927, seven cases were notified in Barbados as typhoid fever, the epidemic being fulminant and reaching 300 in 5 weeks. In November, Seagar visited the Island and found *P. falciparum* in the blood films he took from these patients. The initial cases were without rigors, but with vomiting and sometimes early jaundice. Deaths were mainly in the elderly and weak; attacks were milder in children; splenomegaly was absent. *Anopheles albimanus* was found widespread in grassy pools; it had never been found before. The plasmodium was probably imported in returning Cuban labourers and the anopheles in the holds of small schooners trading with the Antilles or Demerara. Extermination is favoured by the porous coral formation which leaves little surface water in the dry season; it is apparently being hindered by dispute as to whether antimosquito measures should be anti-larval or anti-adult. As Seagar says "In the case of an epidemic of malaria such as that in Barbados, success can only be achieved by a vigorous attack from all angles." Seagar, if one reads rightly, does not seem hopeful that local action will prove sufficiently varied or sufficiently vigorous.

ii. Dr. Andrew Balfour notes that after a visit to Barbados in 1914 he pointed out the risk of seafaring anopheline immigrants and suggested the construction of traps, in the form of ideally constructed breeding places close to the wharves. He was told that "it would immediately result in a campaign of calumny, and that any hapless medical man who tried it would run the risk of being accused of enticing deadly insects to the island" He added then "Barbados is justly proud of a fine conservatism, but it may be, and is, carried too far in sanitary matters."

iii. In a postscript Dr. Balfour mentions certain observations by Dr. Hanschell, who writes that, in 1927, he learnt from a master of a small intercolonial schooner how difficult it was to detect mosquitoes in the dark fore-peak unless the process was set about in the proper way. This consisted, most simply, in flapping a cloth round when the insects, which were not stegomyia, were roused.

Clayton Lane.

Raynal (J.). Enquête sanitaire à la Grande Comore en 1925. Observation de paludisme à forme épidémique. [**Epidemic Malaria in Grand Comoro, 1925.**]—*Bull. Soc. Path. Exot.* 1928. Jan. 11. & Feb. 8. Vol. 21. Nos. 1 & 2. pp. 35–54; 132–141. With 3 maps & 1 chart in text. [1 ref.]

This publication tells the sufficiently dramatic story of the introduction of malaria into the Grand Comoro Island, the largest of the group of small islands which lie between the north end of Madagascar and the mainland. It contains the active volcano Karthala. At its northern point at Bangoi-Kouni there began in October, 1925, a vague epidemic,

not accompanied by typical attacks, but which the local medical man, Ramasy, one of the three the island possesses, concluded from its reaction to quinine to be malaria. He was not believed, for there never had been malaria in Comoro, and so the town lost by death a third of its thousand inhabitants and now has a spleen rate of 41. The spread of malaria throughout the island during 1924 and 1925 is mapped out, and now Moroni, the chief town on the west coast, shares with Bangoi-Kouni the fame of a spleen rate of 41 which in other places varies, down to 3 in Kombani, east of the central mountain range. All species of parasites are concerned, 104 positive slides showing *P. falciparum* in 58, *P. vivax* in 34, and *P. malariae* in 12. Quinine has not been readily accepted. As a rule increased prosperity brings lessened malaria; in this case increased prosperity, the result of vanilla and coconut production, has meant the opposite. In this island into whose light volcanic soil water disappears and which seems to possess almost no surface water, increased prosperity has meant that almost everyone has built his own unprotected water cistern. This would have been well in 1908, when there were no mosquitoes on the island, but now these cisterns may be found swarming with larvae. Moreover, 1925 was an exceptionally rainy year, and the Mohammedan fast of Ramzan, with its weakening effect, fell in April-May and coincided with the flaring up of malaria. Breeding occurs here also in the axils of the coconut palm. Preventive measures recommended follow usual lines, except that coconut oil is the cheapest oil available. It is held that a European doctor conducting an anti-malarial campaign will enable Grand Comoro again to merit from its inhabitants the appellation of "the pearl of the Indian Ocean." This clearly must rest solely with the inhabitants.

C. L.

Arlo. Une mission antipaludique à la Réunion. [**An Antimalarial Mission in Reunion.**—*Ann. de Méd. et de Pharm. Colon.* 1927. Oct.–Nov.–Dec. Vol. 25. No. 4. pp. 413–447.

——. Rapport sur une mission antipaludique à la Réunion.—*Rev. d'Hyg. et de Méd. Préventive.* 1927. Nov. & Dec. Vol. 49. Nos. 11 & 12. pp. 820–857; 925–940.

A detailed report of local incidence of malaria. The spleen and parasite indices were 0 to 75 and 53·35 respectively. Suggestions for prevention follow the usual lines. The species of anopheles concerned does not seem to have been determined. The infection is mostly with *P. vivax*, *P. malariae* is frequent, *P. falciparum* rare.

C. L.

Mansfield-Aders (W.). **Notes on Malaria and Filariasis in the Zanzibar Protectorate.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1927. Nov. 25. Vol. 21. No. 3. pp. 207–214. With 1 map.

Malaria.—Six anopheles have been identified in Zanzibar, *A. costalis*, *A. funestus*, *A. mauritianus*, *A. maculipalpis*, *A. squamosus*, *A. longipalpis*, The last four have never been found engorged in houses, and only the first two have been dissected. *A. costalis* showed a sporozoite rate of 7·7 per cent. in 1,833 examined seven days after capture, having been fed on date and water in the meantime, with a low mortality. In the same circumstances the sporozoite rate of 1,167 *A. funestus* was 7.

The central prison showed the lowest rate, 3·8. Both mosquitoes breed widely, *A. costalis* wherever there is sun even in shallow depressions in coral rocks just above high-water mark, *A. funestus* wherever there is shade. The parasite rate for African children is 67·8 and the gametocyte rate 13·6, the corresponding rates for *P. vivax* being 38·7 and 8·4, for *P. falciparum* 19·6 and 3·3, and for *P. malariae* 5·7 and 2·2. The adult rate is about 20 per cent.

C. L.

Sergent (Edm. & Et.), Catanei (A.) & Senevet (G.). Monographies des localités dénoncées comme palustres en Algérie. Troisième série. Etudes épidémiologiques et prophylactiques du paludisme en 1925–1926. [**Epidemiological and Prophylactic Studies of Malaria in Algeria. 1925-26.**]—*Arch. Inst. Pasteur d'Algérie.* 1927. June. Vol. 5. No. 2. pp. 131–160. With 25 text figs. (4 maps).

This note continues the published record of local incidence of malaria in Algeria with suggestions for prophylaxis. It is illustrated by an outline map and, in most localities, by a diagram of splenic and parasitic indices and by a sketch of the place under report. The local value of this survey will prove very great. It should be a valuable pattern to others.

C. L.

Bengal. Public Health Department. **Report of the Malaria Survey of the Jalpaiguri Duars.** [Stewart (A. D.).]—pp. xi + 67. With 1 plan. 1926. Calcutta. Govt. Press. For official use only.

Malaria and mosquito surveys were carried out on tea gardens in the Himalayan foothills east of the Tista river in the years 1924–25 by Sur and Iyengar and inspected by Stewart. The report, published in 1926, has just been received. It is an attempt to apply to the Duars the Malayan system of subsoil drainage. The Meenglas Tea Estate was the spot selected, having a spleen and parasite index of 90 in August 1908, and a spleen rate of 68 in March, 1914. Over an area of about half a square mile of undulating country with streams in the valleys, having a gradient of 1 in 100 to 1 in 60, the streams were taken underground in four-sided sub-drains formed by stone blocks at bottom, sides and top. Larvae were never found in these unless they were exposed by a cow, a washerman or a fisher of sprats. Further down the water entered concrete troughs. The covered drains removed all normal surface water but this ran above them for a day or two after heavy rain. Other exposed water was oiled. It was found that flushings of streams did not carry off larvae, which attached themselves to the edges and hung on till the risk of being swept off had passed. Malaria was in fact reduced, as judged by the spleen index, but rather disappointingly so, a fact attributed to the smallness of the area treated. Labour is free and not too plentiful and managers mostly anxious to improve conditions ; opposition to this comes essentially from the coolies themselves. A few hours' work a day gives them enough to live on, an occasional extra hour a weekly drink, and a month's hard work enough for a wedding feast ; and this is all the work that many will do, while ruining good houses by filth and cattle wallows. Still industry and thrift are rapidly increasing, the most hopeful aspect of the problem.

The most dangerous anopheles found are *A. maculatus*, *A. listoni*, *A. culicifacies*. Malaria can be suppressed in the Duars not by the action of isolated enthusiastic managers, but by concerted action of these over a number of adjacent gardens.

C. L.

CRAWFORD (V. J.). **Notes on Malaria in Maymyo.**—*Jl. Roy. Army Med. Corps.* 1928. Feb. Vol. 50. No. 2. pp. 109–116.

Maymyo, Burmah, lies at 3,500 feet with an annual rainfall of about 60 inches and a mean summer temperature of 70°–74° F. The garrison comprises two Burmese and one British battalion. Anopheles are few, found only 3 times in 3 years, yet the malaria rate in troops has been as high as 25 per cent. per annum. The stricter use of antilarval measures round barracks and a two-months course of quinine, 10 grains daily except on Sundays, to all Chin and Kachin recruits, and to all sepoys returning from leave, have brought down the admission ratio per 1,000 to 69·11 for British troops and from 202·75 to 101·17 for Indian ones.

C. L.

SENIOR-WHITE (R.). **Studies in Malaria, as it affects Indian Railways.**—*Indian Med. Gaz.* 1928. Feb. Vol. 63. No. 2. pp. 55–72. With 5 charts (1 folding) & 11 figs. on 3 plates. [7 refs.]

" A death a sleeper " describes the construction of railway lines in certain hyperendemic areas of India. This paper gives information regarding such construction in north-eastern Madras. In 1897 a survey of this part broke down from illness of the staff, in 1907 the process was repeated, in 1923 a survey of a portion with duplicated staff left 25 per cent. effective on completion. The paper describes the writer's arrival at a section of the surveyed line which was supposed to be still outside the hyperendemic area and on which work had just started on squashy ground where every foot print filled with water and bred *A. culicifacies*, the improvised herringbone drainage, the oiling, the scarce labour collected into camps and not strung along the line, village spleen rates of 62 to 67, obstructive contractors, the final collection of statistics of fever incidence from the coolies themselves, and, as a result, a malarial incidence which never reached 2 per cent. of the total strength. It is not difficult to see between the lines the immense amount of personal work put in by the writer. Full local details and beautiful photographs are found in this valuable paper.

C. L.

MORIN (Henry G. S.). Recherches sur l'index paludéen de la population indigène dans la région du Kontum (Centre Annam). [**The Malarial Index of the Natives in the Kontum District of Annam.**]—*Bull. Soc. Path. Exot.* 1928. Jan. 11. Vol. 21. No. 1. pp. 26–34. [Pasteur Inst., Saigon.]

This large fertile plateau two to three thousand feet high, and about 14° N. latitude, has recently been partly opened up, and Annamite labour imported. These coolies strike all newcomers by their miserable appearance—tired, unhappy, cachectic—in marked contrast to the Moïs warriors and hunters. An inquiry into the cause of this condition

was instituted through the Pasteur Institute, Saigon. Apart from local details, the most important point is perhaps that splenomegaly in the imported Annamites ran as high as 99 per cent, in one village, whereas in the Moïs tribes from the same village it amounted to 12·6. Blood infection was high, the parasite being most frequently *P. malariae* in the indigenous Moïs and *P. falciparum* in the imported Annamites. No evidence was found that leishmania is significantly responsible for the splenomegaly. [The question whether ankylostomiasis is concerned in the wretched condition of the Annamite is not raised.]

C. L.

Borel (M.) & Le-van-An. Le paludisme à Saigon. [**Malaria at Saigon.**]—*Bull. Soc. Path. Exot.* 1927. Dec. 14. Vol. 20. No. 10. pp. 994–1004. With 3 text figs.

This work is mainly of local interest. Most of the infection concerned is with *P. vivax*. The general percentage of infection is put at less than 11, at 4·5 in children attending dispensaries, and at 0·39 in school children. It mainly occurs in hutted quarters of the town, which are gradually disappearing, houses of stone or brick replacing huts. *A. fuliginosus* and *A. kochi* are but sparsely represented. Many coolies from Tonkin and Annam have appeared locally, and introduced a nebulous epidemic.

C. L.

Dorolle (P.). Le paludisme à Hagiang (Tonkin). [**Malaria at Hagiang.**]—*Bull. Soc. Path. Exot.* 1927. Nov. 9. Vol. 20. No. 9. pp. 895–921. [5 refs.]

Among many observations of great local value are some of general interest. Hagiang, near the Yunnan frontier, altitude 500 to 660 feet, is one of the most malarious posts in Tonkin. The spleen rate, even in Europeans, is 80 per cent. and the death rate from malaria about 4 per cent. per annum. Of 643 blood smears examined in persons suspected of malaria 65 per cent. were positive, and of the positives the percentages of infections were : *P. falciparum* 62, *P. malariae* 15, *P. vivax* 13, *P. falciparum* and *P. malariae* 7, *P. vivax* and *P. falciparum* 3. Of 350 mosquitoes examined, only 10 were anopheles and Dorolle has never seen an anopheles larva there. His predecessor had equally remarked on the rarity of anopheles. In discussion Leger said that in 1910 he and C. Mathis were told regarding Tuyen-Quang, in Tonkin, that anopheles were practically absent. They took a laboratory boy there who was very skilful in catching mosquitoes and he captured 840 anophelines in three evenings.

C. L.

Walch (E.) & Soesilo (R.). **Malaria in Tegal.**—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1927. Vol. 67. No. 6. pp. 777–823. With 4 plates & 9 figs. (2 maps). [5 refs.]

This is one of the detailed reports which are put out from the Dutch East Indies—in this case concerning itself with an epidemic of malaria breaking out in 1926 in a town of 28,000 inhabitants on the north coast of Java. In one district the parasite rate in children reached 67 with a spleen rate of 81. In another the two rates were 47·5 and 100, the spleen rate for all inhabitants examined being 94·5. In another district

of 2,998, there was a parasite rate of 38·6 and a death rate during 16 weeks of 115·1 per thousand. Tertian malaria comprised nearly three-quarters of the cases and quartan less than 5 per cent. The percentage of crescent carriers was as high as 85 in places. Of 245 *A. ludlowi* 2 per cent. were infected and of 447 *A. rossii* one or 0·2 per cent.

C. L.

MARCHOUX (Emile). Anophelismo e paludismo. [**Anophelism and Malaria.**]—*Rev. Med.-Cirurg. do Brasil.* 1927. Oct. Vol. 35. No. 10. pp. 399–403

Read in Portuguese before the Academy of Medicine, Rio de Janeiro, this paper deals in the main with work already reported for Corsica (this *Bulletin*, Vol. 23, p. 136) and for the Rhone valley (*loc. cit.*, Vol. 24, p. 256). The writer summarizes his conclusions much as follows. There is no relationship between the number of anopheles found and the intensity of malaria present ; indeed he goes so far as to state that the more anopheles the less malaria, so that the essential point is to discover not how to destroy mosquitoes, but how to protect man. This defence must be based on economic features of which the most important is the standard of living of the population in country districts ; for the anopheles is not, as is the vector of yellow fever, a town dweller.

C. L.

SWELLENGREBEL (N. H.). Eine Vergleichung der änderungen, welche die jährlichen Zahlen der Malariakranken und Anophelen in den letzten Jahren in der Umgebung Amsterdams aufwiesen. [**A Comparison of Fluctuations in the Annual Figures of Malaria and Anopheles about Amsterdam.**]—*Abhandl. a. d. Gebiet d. Auslandskunde. Hamburg. Univ.* 1927. Vol. 26. (D., Med. & Vet. Vol. 2.) [Festschrift NOCHT.] pp. 542–546. [Trop. Hyg. Inst., Amsterdam.]

Writing from the Tropical Hygiene Institute, Amsterdam, Swellengrebel recalls the fluctuating annual incidence of " intermittent fever " in Amsterdam from 1849 to 1875. Starting about 2,500, it reached 5,600 in 1852 and nearly 24,000 in 1857, falling to about 2,000 in 1861, rising to 5,000 in 1883, reaching 1,600 in 1867 and 1,700 in 1875. Malaria in Amsterdam was 1,669 in 1921, 2,392 in 1922, but still 403 in 1926, the population having in the meantime more than trebled as compared with earlier days. The " intermittent fever " curve has two annual apices, one in March to May and another in September or October, with quartan fever reaching 21 per cent. The recent outbreak had its maximum in May or June, with quartan infection almost completely absent. An interestng table shows the malarial infections in Wormerveer from 1902 to 1926 occurring in the medical practice, covering about 3,000 persons, held first by KORTEWEG and then by LAMPE. The turning points of the curve are 1902, 540 ; 1904, 56 ; 1906, 126 ; 1910, 3 ; 1912, 40 ; 1914, 10 ; 1922, 326 ; 1924, 12 ; 1926, 18. The recent epidemic round Amsterdam is not associated with excessive abundance o anopheles but there is a rough [quite rough] connexion between this and the number of anopheles caught in houses.

C. L.

MATARANGAS (G.). La Grèce pays d'élection du paludisme. [**Greece and Malaria.**]—*Bull. Office Internat. d'Hyg. Publique.* 1927. Oct. Vol. 19. No. 10. pp. 1457–1459.

A historical note presented to the Committee of the Office International d'Hygiène Publique.

In 1905 a Committee was formed which spread broadcast knowledge of the cause, prevention and treatment of malaria and worked on improving the health of Athens and Marathon. In 1907–8 the State instituted the sale of large quantities of quinine at cost price, and the incidence of malaria fell in 3 years from 29·09 to 9·83 per cent.; three million drachmae were assigned yearly for drainage In 1915 another half million was added, and special sums allotted for the drying up of 56 marshes. In 1922 local authorities were pointedly reminded of their duties, and a Ministry of Health was formed. Quinine proved quite insufficient for the rise in infection, caused by the influx of a million and a half infected refugees into a country of 1,731,288 inhabitants with an infection rate of 21·56 per cent. In 1925 an arrangement was made between the State and La Compagnie Anglo-Americaine Faountessi for the draining of the Salonika plain and the Artzan and Amatovou lakes, and for work to prevent flooding. Since then active propaganda has been carried on ; and medical men have received instruction. Malarial morbidity has decreased from 32·03 to 16 per cent. and mortality from 3·32 to 1·16.

C. L.

LIPPINCOTT (Leon S.). **Observations on Malaria.**—*New Orleans Med. & Surg. Jl.* 1928. Jan. Vol. 80. No. 7. pp. 413–415. [4 refs.]

The cases officially returned as malaria to the State Board of Health, Mississippi, numbered during seven years 776,558. In Warren County during seven years 13,803 cases were reported as malaria. In 13,034 examinations made there during these 7 years Lippincott found parasites 117 times or in 1·36 per cent. ; 12·99 per cent. of the positives were from negroes. Tertian malaria appears mainly from May to August and comprises the majority of cases, and subtertian from September to November. The normal local percentage of large monocytes being put at 6·5, the figures of tertian infections were 8·5 and of subtertian 10·1. There was no leucopenia. The discrepancy between the clinical reports and laboratory findings, it is pointed out, does great harm. The former are broadcast and deter prospective settlers and visitors at a time when great efforts are being made to bring these to the State, and the paper read before the State Medical Association points out to medical men the harm these incorrect diagnoses are inflicting on the community.

C. L.

ROUBAUD (E.). Sur l'inaptitude du *Plasmodium praecox* à l'évolution hivernale chez l'*Anopheles maculipennis*, et ses conséquences épidémiologiques pour l'Europe septentrionale. [**Non-development of *P. falciparum* in *A. maculipennis* in Winter : its Epidemiological Results for N. Europe.**]—*C.R. Acad. Sci.* 1928. Jan. 30. Vol. 186. No. 5. pp. 329–331. [7 refs.]

JANCZO has shown that *P. vivax* develops to sporozoites at 15° to 17° C. in *A. maculipennis* in about 53 days. SWELLENGREBEL has shown that

about Amsterdam two consecutive developmental cycles occur during the winter, the mosquitoes remaining in houses. Regarding *P. falciparum*, it is noted that WENYON in Macedonia found no development during hibernation at temperatures between 9·6° and 18·2° C., Roubaud's experience coinciding. He quotes three series of experiments with *P. falciparum* in which development occurred freely in the mosquito at temperatures of 20° to 25° C. but not at lower ones. He accepts this as conclusive and puts forward the following as a hypothesis for the distribution of malaria in Europe. Anopheles are deviated by cattle in the warm months, the winter being the dangerous time of infection for man. At this season *P. vivax* is carried by anopheles hibernating in houses while *P. falciparum* is not. [In comment it may be noted that the value of the hypothesis depends entirely on the degree to which *Anopheles maculipennis* is a total abstainer from human blood. If she is not absolutely so, and the English autochthonous war infections show that she is not, the hypothesis seems an imperfect explanation.]

C. L.

RUGE (Reinhold). Warum bei Malaria keine volle Immunität entsteht? [**Why is there No Complete Immunity in Malaria?**]—*Med. Welt.* 1927. Oct. 29. Vol. 1. No. 39. 2 pp.

Ruge points out that malaria pigment is found always in the endothelial cells of the capillaries, venules, and sinuses, in the macrophages of spleen and lymph glands, and in the large mononuclear leucocytes, and concludes that there is failure to produce immunity to malaria because the reticuloendothelial system is blocked by the granular pigment just as it may be blocked by Indian ink, tryparosan or collargol ; and just as splenectomy produces relapsing fever infection or trypanosomiasis in mice, or the inundation of the blood by *P. kochi* in monkeys and by malaria parasites in man.

C. L.

WILLCOCKS (William). **Why is Cultivated Egypt Immune from Malaria ?**—13 pp. With 2 Appendices & Note on Discussion. 1927. Dec. Cairo : Printed at the Nile Mission Press.

Sir William Willcocks is satisfied that the relative [it is not absolute as his paper suggests] immunity of Egypt from malaria is due to clover, and all else is fitted into the picture. " There must be something in all leguminous plants, especially in certain kinds of clover, which makes mosquitoes immune from malaria." He quotes D'HERELLE that in all malaria-free regions of Argentina there is a scented clover, *Melilotus altissima*, whose blossoms are frequented by the malaria mosquitoes which feed on the syrup coumarin and he asks—May not this act on the mosquito as does quinine on man? Melilotus introduction has coincided with expulsion of malaria from certain islands of Zealand and from the northern provinces of Holland. In comment it may be asked—Has the freedom from malaria of cultivated Algeria anything to do with clover? or for that matter is cultivated England's freedom so caused?

C. L.

Buice (W. A.). **Biological Difficulties in Eradicating Malaria.**—*Southern Med. Jl.* 1927. Dec. Vol. 20. No. 12. pp. 931–933. [10 refs.] [School of Med. Univ. Oklahoma, Norman, Okla.]

"There are five biological difficulties in eradication of malaria which were not encountered in the extermination of yellow fever: (1) possible persistence of the infecting agent in the body of the recovered malarial patient; (2) persistence of the infecting agent of malaria in the body of the mosquito host over the winter season; (3) the wide-spread distribution of malaria, which does not exist in a few endemic localities only; (4) the mosquito host of the malarial parasite breeds in natural bodies of water and the larvae are thus difficult to reach and destroy; (5) the travelling habits of anophelines, which often carry them as far as two and one-half miles from their breeding places. These five obstacles present factors which probably for a number of years will prevent the total eradication of malaria in the Western Hemisphere, as has been accomplished for yellow fever."

C. L.

Maxcy (K. F.), Barber (M. A.) & Komp (W. H. W.). **On the Significance of Spleens Palpable on Deep Inspiration in the Measurement of Malaria.**—*Public Health Rep.* 1927. Dec. 9. Vol. 42. No. 49. pp. 3010–3021. [19 refs.]

It is recalled that Darling rendered spleen palpation more delicate than it is as commonly used in the field by making the children lie down and breathe deeply. The spleens made palpable by this means were carefully investigated by those writing this paper and checked by thick films. It is concluded that the procedure makes palpable in children a large number of normal spleens, while figures so obtained cease to be comparable with those collected in other countries. It is the spleens which reach or extend below the costal margin which are significant in the measurement of malaria.

C. L.

Canciulesco (M.), Herman (Leon) & Hirsch (R.). Adrénalinodiagnostic du paludisme latent. [**Adrenalin Diagnosis of Latent Malaria.**]—*C. R. Soc. Biol.* 1928. Feb. 17. Vol. 98. No. 6. pp. 459–460. With 1 text fig.

By mouth adrenalin has proved ineffective as a provocative of the entrance of malaria parasites into the circulation; it is neutralized by the gastric juice. Subcutaneously it has been given in 12 cases in doses of 0·5 to 1 mgm. and, these failing, of from 1·5 to 2 mgm. Seven cases have shown plasmodia in 15 to 60 minutes. The five who failed had previously received a very thorough course of quinine and arsenic. On one occasion injection of 2 mgm. gave rise to symptoms which had to be combated by amyl nitrate. It is concluded, as so often without evidence offered, that appearance of parasites in the circulation makes them more susceptible to quinine.

C. L.

Pulido (A.). Hypothèse d'une immunisation indirecte probable contre le paludisme. [**Does Indirect Immunization against Malaria exist?**]—*Bull. Office Internat. d'Hyg. Publique.* 1927. Oct. Vol. 19. No. 10. pp. 1455–1456.

This communication, made to the Office International d'Hygiène Publique in April-May 1927, is concerned with work by Dr. Ferran at

the Royal Academy of Medicine of Spain. Starting from the observation that anopheles prefer some human beings and altogether neglect others Dr. FERRAN put to himself the question whether antibodies were formed which produced negative tropism of mosquitoes towards certain individuals. He first proved that injections of bodies of crushed mosquitoes, up to a quantity of 5 injections each representing 5 mosquitoes, were harmless. The mosquito bite ordinarily produces a red spot 2 mm. in diameter surrounded by a pale areola. After injection of mosquito antigen the red spot was smaller and the pale areola absent. The question is still under investigation.

C. L.

PLAWTOW (K. A.). Ueber das Verhältnis zwischen Chinin, Leukozyten und Parasiten im Blute von Malariakranken. [**Relation between Quinine, Leucocytes and Parasites in the Blood of Malarial Patients.**] —*Arch. f. Schiffs- u. Trop.-Hyg.* 1927. Dec. Vol. 31. No. 12. pp. 587–589. [Lab., Health Commissariat, Nakhichevan, Russia.]

In an earlier work which cannot be traced Plawtow had shown that plasmodia live for 30 days in a hanging drop, in which can be observed the phagocytosis of red corpuscles and their contained parasites. The method lends itself to the study of the action of quinine. He now makes the following statements.

(*a*) Phagocytosis of all stages of all malaria parasites can be observed at summer temperature in a hanging drop. Unknown factors make of phagocytosis a concerted action occurring immediately on making the drop or even next day. Its time has no connexion with malarial attacks. Using the known factor of raising the temperature from 13° to 17° R. resting leucocytes can be rendered active in 10–30 minutes. The polynuclears and monocytes act as phagocytes and a phagocyte can swallow several infected erythrocytes but apparently cannot be induced to enjoy another such meal. In a smear made from a hanging drop free parasites may be found.

(*b*) The action of quinine on leucocytes does not prevent their engulfing and dissolving red cells and parasites leaving only melanin. Later the leucocyte dies. This phagocytosis may occur after quinine administration either in the blood stream or hanging drop, and a leucocyte which has so fed in the blood stream will feed again in hanging drop, but no leucocyte will take two meals in a hanging drop. These meals have no relation to the malarial attack wherever partaken of. Varying degrees of digestion of parasites and erythrocytes indicate different meals.

(*c*) The effect of quinine on the parasites is such that parasites spared by leucocytes live several days in the blood of those treated by quinine. Escape of parasites from erythrocytes under the influence of quinine was not observed.

(*d*) The technique would seem to have already been described. It is here noted that at a temperature of 37° C. the phenomena mentioned are too quickly enacted to be properly observed. It is advised to leave the preparation over night at a temperature of 20–23° C. and the method is recommended as being simple and worth investigating for the knowledge it will bring.

C. L.

KONSULOFF (St.). Ueber die Ursachen der aktiven und latenten Perioden der Malaria. [**Causes of Active and Latent Periods of Malaria.**] —*Arch. f. Schiffs- u. Trop. Hyg.* 1928. Feb. Vol. 32. No. 2. pp. 57–62. With 2 text figs. [10 refs.]

The pith of this paper lies in the line and a half which state that the characteristics of the curve of diffused sunlight correspond to the seasonal curve of malaria. These light curves, as illustrated in the paper, have their maxima (in the northern hemisphere of course) in June or July. No mention is made of the different seasonal maxima which the different kinds of malaria affect.

C. L.

i. MASELLI (D.). Il sistema nervoso vegetativo nella infezione malarica. [**The Vegetative Nervous System and Malaria.**]—*Policlinico.* Sez. Med. 1927. Sept. 1. Vol. 34. No. 9. pp. 441–460. [13 refs.]

ii. ——. Lo stato della tiroide nella infezione malarica. [**The Thyroid in Malaria.**]—*Ibid.* pp. 472–481. [9 refs.] [Clin. Med. Inst., Univ. Rome.]

iii. MACCIOTTA (G.). Sulla possibile influenza della malaria nella ezio-patogenesi del rachitismo. [**Influence of Malaria on the Pathogenesis of Rickets.**]—*Ibid.* pp. 460–471. [7 refs.] [Clin. Pediat. Inst. Univ., Sassari.]

i. Dr. Maselli gives an account of some experiments performed at the Clinic of Prof. ASCOLI in Rome to investigate the condition of the sympathetic nervous system in patients suffering from malaria. Tests were made with atropine, pilocarpine, adrenalin, etc. In the benign tertian malaria an exaggerated excitability of the sympathetic nervous system could be demonstrated at the commencement of an attack, followed by a vagoexcitability at the end of it (for instance, bradycardia). These phenomena were more pronounced in cases of subtertian malaria, where also a marked hypoexcitability of the cardio-vascular system to adrenalin was found.

ii. In another article the author discusses the influence of malaria upon the thyroid gland. His observations on a group of patients suffering from malaria did not reveal any marked changes in the function of that organ. Only in one case was there a slight increase of the circumference of the neck during the attack. Histological examination of the thyroid glands in two fatal cases of subtertian malaria did not show any pathological changes.

iii. In a number of cases of rickets investigated in Sardinia, Prof. Macciotta, of Sassari, finds a connexion between rachitic changes and a malarial infection of the child or of its parents, especially of its mother during the pregnancy. Infantilism and other dystrophic changes following malaria have been described before by others and the author thinks that the influence which malaria exercises upon endocrine glands, upon the function of the spleen and liver, on the haematopoietic system and the mineral metabolism of the body, may favour the development of rickets. He finds an increased elimination of calcium from the body during a malarial attack and ascribes it to the acidity of the blood and to the impairment of function of the spleen.

H. Lwow.

Clearkin (P. A.). **Malaria or Meningitis.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1928. Mar. 31. Vol. 21. No. 6. pp. 479–480. [10 refs.]

A European child of 13 months, thought by the parents to have influenza, died after a convulsion on the way to medical aid. At autopsy, eighteen hours later, the condition of liver and spleen was that of chronic malaria. The dura was adherent to the vault and to the pia-arachnoid which was thickened, injected and oedematous. Two to three ounces of cerebrospinal fluid escaped, which contained large gram-positive bacilli, resembling those associated with decomposition, and many malaria parasites, probably subtertian. The meningeal vessels were enormously dilated and packed with parasites, with leakage into the subarachnoid spaces and brain. It is asked " Was this a case of cerebral malaria following on meningitis of other origin, a meningitis of other origin supervening on malaria, or a true malarial meningitis? "

C. L.

Henriques (J. F.). **A Case of Cerebral Malaria.**—*Indian Med. Gaz.* 1928. Jan. Vol. 63. No. 1. p. 18.

A Hindu girl of 14 was seen unconscious with a temperature of 105°. Subtertian parasites were present. She received 12 grains of quinine intravenously, 28 grs. intramuscularly, 75 grs. orally, and 11 plasmochin tablets before the temperature came to normal on the 6th day. Quinine medication had been refused by another practitioner till her temperature fell to 100° " but this never happened, so the patient went on to develop cerebral malaria."

C. L.

Pereira (Lafayette). Neuro-impaludismo (Aphasia de Broca—Manifestações cerebellares). [**Malaria affecting Central Nervous System.**]—*Arch. Brasileiros de Med.* 1927. Aug. Vol. 17. No. 8. pp. 767–774. [5 refs.]

A sailor of 24, with *Plasmodium falciparum* in the blood, and a strongly positive Wassermann reaction showed such nervous symptoms as nystagmus, sensory aphasia, and ataxia with lively reflexes and no loss of sensation. Spinal puncture showed albumin 0·22 per cent., glucose 1·3 per cent., a turbidity indicating globulin and a lymphocytosis of 2·2 per cmm. Improvement followed exhibition of quinine and novarsenobenzol. The case is discussed.

C. L.

Wesenhagen (G. F.). Maag- en darmstoornissen bij malaria. [**Gastric and Intestinal Disturbances in Malaria.**]—*Nederl. Tijdschr. v. Geneesk.* 1928. Jan. 21. Year 72. 1st Half. No. 3. p. 313.

As an example of predominant gastrointestinal symptoms in malaria, the author describes two cases of children with high temperature, vomiting and diarrhoea. In one case the stools contained blood and mucus. The spleen was enlarged in both cases and malaria parasites were found in the blood. Tests for typhoid and dysentery were negative and the symptoms disappeared rapidly with quinine.

H. Lwow.

Still (R. M. Lloyd). **A Case of Heat-Stroke combined with Malaria.**—*Jl. Roy. Nav. Med. Serv.* 1928. Jan. Vol. 14. No. 1. pp. 55–56. With 1 chart in text.

A man with high temperature was treated with ice packs, in which collapse came on, until a blood examination showed subtertian malaria. Under quinine recovery seems to have been uninterrupted.

C. L.

Tsakalotos (A. E.) & Choremis (K.). Ein Fall von kongenitaler Malaria. [**A Case of Congenital Malaria.**]—*Klin. Woch.* 1927. Nov. 5. Vol. 6. No. 45. pp. 2146–2147. [3 refs.]

Plasmodium vivax was found in the child a month after birth. The history is that the mother had " malaria " at the 8th month, and after quinine treatment miscarried. Owing to her condition, the child was put out to nurse, and began to have fever a week later. The incident occurred in the Province of Helias in the Peloponnese, one of the most malarious areas of Greece.

C. L.

Beselin (Oskar). Ueber Hörstörungen bei Malaria. [**Affection of the Ear in Malaria.**]—*Abhandl. a. d. Gebiet d. Auslandskunde. Hamburg. Univ.* 1927. Vol. 26. (D., Med. & Vet. Vol. 2.) [Festschrift Nocht] pp. 37–38.

The writer puts and, as far as he can, answers 3 questions. (1) Does untreated malaria damage the inner ear? An open question only to be answered by combined clinical and post-mortem investigations. (2) Is tabetic deafness bettered by a malaria treatment? Unanswered, but the few cases available suggested that it is not. (3) How may quinine-induced deafness best be avoided? Small repeated doses harm the hearing less than single large ones.

C. L.

Hollmann (G. F.). Ueber Veränderungen an den Netzhautgefässen bei Malaria. [**Changes in the Retinal Vessels in Malaria.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1928. Feb. Vol. 32. No. 2. pp. 82–87 [1 ref.] [German Hosp., Tiflis.]

Hollmann associates with malaria a formidable list of ocular symptoms, of possible diagnostic value when parasites are not found in the peripheral blood. The grounds of diagnosis are so far clarified that, in 440 cases where the changes were not retinal, parasites were found in 36. The retinal changes described affect both eyes equally and include congestion and sinuosity of the retinal vessels, and a strong, linear light reflection not dependent on the intensity of light and showing in places a crystalline effect angular or scalloped, more evident at the margins of the retina and on the veins. At these places there project for 3 or 4 mm. into the vitreous transparent shiny structures, as if some transparent folded membrane were there. Among other conditions described are asthenopia, dilated and sluggish pupils, and congested conjunctivae with a feeling of dryness, itching or burning. The crystalline appearance in the vitreous is attributed to ormation of cholesterin.

C. L.

Dürck (Hermann). Ueber entzündliche Veränderungen der weichen Hirnhäute am Hirnventrikelependym bei perniziöser Malaria tropica. [**Inflammatory Changes in Pia Mater and Ventricle Ependyma in Subtertian Malaria.**]—*Abhandl. a. d. Gebiet d. Auslandskunde. Hamburg. Univ.* 1927. Vol. 26. (D., Med. & Vet. Vol. 2.) [Festschrift Nocht.] pp. 79–88. With 5 figs. on 2 plates. [16 refs.]

Dürck summarizes results of examinations of about 40 brains of those who have died of cerebral malaria. Infiltration varies from a few

sparse lymphoid cells in scattered localities to large collections together with infiltration of blood. In pial veins there are polymorph leucocytic thrombi with almost no parasites or pigment even when capillaries contain many of them. Excellent photomicrographs display the conditions noted as well as the nodules which the writer has previously described. [See this *Bulletin*, Vol. 23, p. 626.]

C. L.

Wolski (M. E.) & Schewelewa (E. M.). Zur Pathogenesis der Anämia bei Malaria. [**The Pathogeny of Anaemia in Malaria.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1928. Mar. Vol. 32. No. 3. pp. 121–137. With 1 chart in text. [27 refs.] [Therap. Clinic, Univ., Samara.]

The conclusions reached are accepted ones. Some toxin, associated with malaria attacks, destroys uninfected erythrocytes and with the attack the faecal excretion of urobilin is increased for about two days. Destruction is greater with severe attacks and it, rather than lessened recuperation, causes the anaemia. The reverse is the case in latent or subfebrile cases. Arsenic should not be given to an already overstimulated bone marrow. The references are all to German literature which does not cover the whole matter.

C. L.

Ruge (H.). 25 Jahre Malaria-Behandlung im Institut für Schiffs- und Tropenkrankheiten. Beobachtung an 4924 Fällen. [**Twenty-Five Years Malaria Treatment in the Institut für Schiffs- und Tropenkrankheiten**]—*Beihefte z. Arch. f. Schiffs- u. Trop.-Hyg.* 1928. Vol. 32. No. 1. pp. 5–68. With 24 charts in text. [4 refs.]

It is impossible to abstract work representing a close study of nearly 5,000 cases of malaria seen during 25 years. Tertian malaria accounted for 1,024, mostly relapses, the majority acquired in America. An interesting table compares the effect of drugs. For example, in 134 primary cases quinine hydrochloride caused schizonts and gametocytes to disappear in 1·8 and 2·5 days respectively, while in 427 relapses the figures were 2·4 and 2·6. In 26 primary cases under plasmochin, schizonts disappeared in 2·7 and gametocytes in 3 days, the figures for 23 relapses being 2·5 and 3·2. In 275 subtertian malarias quinine hydrochloride caused schizonts to disappear in 2·8 and gametocytes in 13·9 days. the corresponding figures for 30 plasmochin treated cases being 3·2 and 4, while in 35 cases in which the two drugs were combined the figures were 15·8 days for schizonts and 11·4 for crescents. In 47 cases of quartan malaria quinine hydrochloride caused schizonts and gametocytes to disappear in 2·7 and 3·7 days, the corresponding figures for plasmochin being 2 and 4. Blackwater fever occurred in 1·7 per cent. of 61 cases of quartan malaria, 0·57 per cent. of tertian, 2·5 per cent. of 2,867 subtertian, and 1·6 per cent. of mixed infections.

C. L.

i. Manson-Bahr (P. H.). **Further Observations on the Effects of Plasmochin and "Plasmochin-Compound" on the Gametocytes of Benign Tertian and Subtertian Malaria.**—*Lancet.* 1928. Jan. 7. pp. 25–26. With 3 text figs. [1 ref.]

ii. ——. **The Treatment of the Malarias.** [Correspondence.]—*Ibid.* Jan. 21. p. 160. [1 ref.]

iii. Low (G. Carmichael). **Treatment of the Malarias.**—*Ibid.* Feb. 4. p. 259. [2 refs.]

iv. Mühlens. Plasmochinbehandlung der Malaria. [**Plasmochin Treatment of Malaria.**]—*Deut. Med. Woch.* 1927. Dec. 23. Vol. 53. No. 52. p. 2202.

i. Dr. Manson-Bahr's records over 8 years in 17 exactly recorded cases, where crescents were as many as from 8 to 132 to every 200 leucocytes and which were put on 2 gm. of quinine hydrochloride daily, show that on the average crescents remained detectable in the blood-stream for 13 days. In two cases crescents were first seen here after the administration of 37 gm. and 28 gm. of quinine. The inference is that quinine is less toxic for the young gametocyte than for other stages of the parasite. In four cases of subtertian malaria, plasmochin was given in daily doses of 0·06 gm. to 0·12 gm. In every instance crescents disappeared from the circulation two or three days before rings, the average time required being 4 days and quantity 0·3 gm. In 6 cases of tertian malaria, gametocytes were as strikingly affected. Regarding plasmochin compound, after 0·03 gm. of plasmochin and 0·375 gm. of quinine sulphate, most gametocytes refused to become spherical and exflagellation could not be induced in any. Within 36 hours, after 0·08 gm. plasmochin and 1 gm. quinine, crescents became deformed, and 24 hours later their disintegration was complete, in some cases the hazy outline of the host cell persisting. The average dosage required for destruction of tertian parasites was 0·12 gm. plasmochin and 1·5 gm. quinine. "The therapeutic effects of plasmochin compound in both forms of malaria has thus been conclusively demonstrated. . . . In order to produce a clinical cure with plasmochin compound it appears necessary to continue n full therapeutic doses (0·06 gm. plasmochin plus 0·75 gm. quinine daily) for three full courses of one week each with intervals of five to seven days in between in order to eliminate the drug from the body." No relapses had occurred.

ii. In a leading article in the *Lancet* attention was called to the conclusions of Fischer and Weise that the maximum daily dose of plasmochin should be 0·03 gm. and their conclusions that in this dosage it acted as a provocative; to the experience of Bärmann and Smits that, as Manson-Bahr noted for quinine, crescents might appear in the blood for the first time after administration of plasmochin (0·8 gm. daily) had continued for 5 days; and to the fact that the dosage of plasmochin which caused disappearance of crescents in Manson-Bahr's cases seems to have been two to four times greater than seemed permissible in the future.

Manson Bahr noted that Mühlens' original dosage was too high and that the tablets now on the market contained only 0·005 gm. of plasmochin and 0·0625 gm. of quinine and advocates dosage of 12 of these tablets daily.

iii. Low is unconvinced that he has had from plasmochin better results than from quinine, iron and arsenic, notes the uselessness of destroying crescents and leaving unhurt rings to produce more, and

suggests that the fact that it is necessary to combine plasmochin with quinine points its own moral.

iv. Mühlens writes that he is represented as advising both two and four tablets of plasmochin compound three times a day. The discrepancy has arisen because the manufacturers have put up " dragées " each containing 0·01 gm. plasmochin and 0·125 gm. quinine and " tablets" containing half that amount. In order to prevent all possibility of confusion he states explicitly that the dosage for tertian and quartan malaria is one plasmochin tablet three times a day each containing 0·02 gm. [that is 0·06 gm. daily] while for subtertian malaria and as a prophylactic the dosage is six plasmochin compound tablets daily in two or in three portions, each containing 0·01 gm. plasmochin and 0·125 gm. quinine [that is 0·06 gm. plasmochin and 0.75 gm. quinine or about 12 grains daily]. The issue of the half dose tablets is definitely discontinued.

C. L.

Olivier (P. H.) & Hulshoff (A. A.). De behandeling van malaria met plasmochinum en plasmochinum compositum. [**Treatment of Malaria with Plasmochin and Plasmochin Compound.**]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1927. Vol. 67. No. 6. pp. 907–921. With 22 charts. [13 refs.]

In this paper with its full protocols of 139 cases, the following conclusions are reached. Plasmochin was taken without protest. Slight cyanosis and abdominal discomfort sometimes occurred. The parasites of tertian and quartan malaria left the blood after a few days, but with relapse in a number of cases. On subtertian rings plasmochin was without nfluence but crescents disappeared in about 6 days. Plasmochin and quinine combined are to be preferred for this infection, rings disappearing in a few and crescents in about 4 days. They need not be given in the same tablet. It is recommended that they should be cont nued for 31 days. Plasmochin is well borne where there is oversensitiveness to quinine ; it should be given only under strict medical supervision.

C. L.

Schiassi (F.) & Merighi (G.). Das Plasmochin in der Behandlung der Kinder-Malaria. [**Plasmochin Treatment in Malaria of Children.**] —*Klin. Woch.* 1928. Apr. 1. Vol. 7. No. 14. pp. 640–641. [Civil Hosp., Ravenna.]

The advantages of plasmochin for children are its tastelessness and its solubility. Cyanosis is the prominent evidence of overdosage, but has usually been accompanied by no other general or local symptom to suggest that it constitutes a toxic symptom of importance. The dosage advised is 1 to 6 months 0·5 cgm. twice daily, or 3 t mes daily for the first 2 days ; 6–12 months 1 cgm. twice daily, but often 0·5 three times daily after the first 2 days ; 1 to 2 years 1 cgm. twice daily after 1 cgm. three times daily for the first two days ; 2 to 3 years 1 cgm. three times daily reduced to twice daily when cyanosis appears ; 3 to 6 years 1 cgm. three times daily, or 4 times for the first 3 days ; 6 to 12 years 4 cgm. daily, reduced to three times daily when cyanosis appears.

C. L.

BENECKE. Ist Plasmochin für die Anwendung durch Laien geeignet? (Ein Beitrag zur Plasmochinbehandlung.) [**Should Plasmochin be employed by Laymen?**]—*Abhandl. a. d. Gebiet d. Auslandskunde. Hamburg. Univ.* 1927. Vol. 26. (D., Med. & Vet. Vol. 2.) [Festschrift NOCHT.] pp. 23–24.

During MÜHLENS' visit to Guatemala early in 1927 the question of the administration of plasmochin by laymen was raised at a hacienda belonging to the Central American Plantations Corporation. Since the manager was German with German assistants there was, it is definitely stated, a guarantee that MÜHLENS' measures would be carried out conscientiously as planned. It is concluded that the administration of plasmochin can unhesitatingly be handed over to laymen. This conclusion is based on experience w th one case of tertian and two of quartan infection who received plasmochin, and of 19 subtertian malaria patients who received plasmochin and quinine at the adult daily rate of 0·05 gm. of plasmochin and 0·65 gm. or 9 1-3 grs. of quinine daily. [The national emphasis or bias above expressed makes it seemly to note that the Germans, FISCHER and WEISE (this *Bulletin* Vol. 25, p. 135), have concluded that the maximum daily dose free from ill consequences is 0·03 gm. and FLETCHER & KANAGARAYER (*loc. cit.*, p. 134), non-Germans, have written of plasmochin "It must be administered under medical care."]

C. L.

MOLLOW (W.). Ueber die gametenzerstörende Wirkung des Plasmochins. [**The Destruction of Gametes by Plasmochin.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1928. Mar. Vol. 32. No. 3. pp. 116–119. With 1 chart & 1 coloured fig. in text. [2 refs.] [Med. Faculty, Univ., Sofia.]

One case is described. Infection was tertian and subtertian. Under 1·5 gm. of quinine urethane daily and intramuscularly for 5 days subtertian rings disappeared, crescents appeared and tertian gametocytes persisted. After another 5 days of plasmochin tablets—daily quantity 0·1 gm.—crescents disappeared, tertian gametes having done so after 1 day. A coloured figure shows the appearance of degenerating crescents.

C. L.

CORDES (Wilhelm). Zwischenfälle bei der Plasmochinbehandlung. [**Incidents in Plasmochin Treatment.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1928. Mar. Vol. 32. No. 3. pp. 143–148. [4 refs.] [United Fruit Co., Preston, Cuba.]

In the Year Book, for 1926, of the United Fruit Company Cordes stated that among 72 malaria cases treated with plasmochin compound (0·08 gm. of plasmochin and 1 gm. of quinine daily) there were 4 cases of serious illness with one death (*ante*, p. 134) and that a separate communication would be issued regarding them. The four cases referred to in the present communication as occurring in the United Fruit Company's service are evidently the same. The deaths were actually two, not one. The toxic symptoms were drowsiness or coma, pallor with marked drop in red corpuscles and haemoglobin,

exhaustion and yellowness ; haemoglobin fell as low as 30, there was a leucocytosis to 24,000 with many young white forms difficult to differentiate. On one blood film SCHILLING reported noted excess of blood platelets and concluded that the condition was one of severe toxic anaemia, with the appearance of damaged bone marrow elements ; such a condition he knows only in an experimental toxic anaemia with severe poisoning of the blood. It resembles the condition in severe cases of blackwater fever and verruga peruviana.

C. L.

SQUIRES (H. C.) **Toxic Symptoms from Plasmochin.** [Correspondence.] —*Lancet.* 1928. Mar. 31. p. 673.

Squires has been using plasmochin with satisfaction for over a year. Within the week before writing he had had four cases, all British, two with subtertian parasites, two clinicaly diagnosed and all receiving plasmochin in doses not exceeding 0·06 gm. in 24 hours and in no case given for more than 5 consecutive days. The symptoms were cyanosis, very marked in 2 cases, and abdominal pain completely preventing sleep in 2 patients, who complained bitterly that they felt they had been poisoned. The drug was from a fresh supply which had been in Khartoum for less than six weeks.

C. L.

ORACHOWATZ (D.). Die Cyanose bei Plasmochinbehandlung. [**Cyanosis in Plasmochin Treatment.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1928. Mar. Vol. 32. No. 3. pp. 119–121. [2 refs.] [Physiol. Inst., Univ., Sofia.]

Two cases of plasmochin cyanosis were investigated, the dosage received not being stated. The oxygen capacity of the blood was reduced to two-thirds of the normal as the result of the conversion of haemoglobin into methaemoglobin. The writer notes that this is no inconsiderable drop and comments unfavourably on SCHLESINGER'S curious recommendation that plasmochin should be administered in croupous pneumonia.

C. L.

LONGO (Domenico). Contributo allo studio della plasmochinoterapia della malaria. (**Contribution to the Study of the Plasmochin Treatment in Malaria.**)—*Riv. di Malariologia.* 1928. Jan.–Feb. Vol. 7. No. 1. pp. 31–37. With 4 graphs. [6 refs.] [English summary p. 81.] [Colonial Hosp., Tripoli.]

" In the Colonial Hospital, Tripoli, the author has treated with the simple plasmochin, 24 tertian cases, and with the combined plasmochin, 5 subtertian (tropical) and 1 quartan case. The drug was first given 4–8 hours before the attack. A plasmochin resistant tertian fever disappeared by the administration of the combined plasmochin. In the other 30 cases fever ceased after 2 days and the parasites (even the subtertian gametocytes) disappeared from the peripheral blood after 4–5 days. The remedy was then given for at least a period of a month, without interruption or with an interval of 5–10 days. It was well tolerated, except in two subtertian cases, in which a light cyanosis and gastric disturbances of short duration

appeared after 3–4 weeks of uninterrupted intake of the drug. Anaemia gradually disappeared. Good results have been obtained in a tertian pregnant woman, in a subtertian quinine resistant case and in a subtertian woman who could not easily take quinine.

"The comparison with 20 quininized tertian cases has shown that equally good results were obtained as by the plasmochin treatment, which, however, was followed more willingly, because it does not provoke the disturbances of 'cinchonism'."

C. L.

MORISHITA (Kaoru Moru) & NAMIKAWA (Hiroshi). Betrachtungen ueber die Plasmochin-Behandlung der Malaria. [**Plasmochin Treatment of Malaria.**]—*Taiwan Igakkai Zasshi* (*Jl. Med. Assoc. Formosa*). 1927. Dec. No. 273. German summary pp. 1–2. [In Japanese.] [Central Inst. for Scient. Research, Formosa, Japan.]

Plasmochin treatment [dosage not given] was undertaken as follows, the cases being followed up for 8 weeks.—Plain plasmochin in 7 acute cases of tertian malaria, relapse occurring in 1 of 4 cases followed up. It again relapsed after a second treatment and had been refractory to quinine. The same drug in 2 quartan cases, one relapsing. Plasmochin compound in 7 cases of subtertian malaria, 2 cases were observed afterwards and neither relapsed. Three of these cases show the symptoms of blackwater fever appearing on the third day. All were country dwellers. There were seen in some cases, cyanosis, tachycardia and abdominal, especially epigastric, pain. On the other hand, in 4 cases of quinine sensitiveness in which this was exhibited with the compound tablets, simple plasmochin is described as acting well.

C. L.

SCHULEMANN (W.), SCHÖNHÖFER (F.) & WINGLER (A.). Beiträge zum chemischen Nachweis des Plasmochins. [**Contribution to the Chemical Detection of Plasmochin.**]—*Abhandl. a. d. Gebiet d. Auslandskunde. Hamburg. Univ.* 1927. Vol. 26. (D., Med. & Vet. Vol. 2). [Festschrift NOCHT.] pp. 507–511.

The author finds that chloranil, or tetrachloro benzoquinone, is a delicate reagent for plasmochin forming with this drug an intensely blue dye, and has devised a method of applying this reaction to the estimation of plasmochin in urine.

Two or three hundred cc. of urine are mixed with 20 cc. of 50 per cent. caustic potash solution to set free plasmochin base, which is then extracted, by agitation with ether three times using 30 cc. each time. The total ethereal extract (90 cc.) is filtered, washed twice with 10 cc. of water containing 2 drops of normal soda solution and the plasmochin then extracted from it by thorough agitation with 6 cc. of 2 per cent. acetic acid solution. The latter is separated, warmed on the water bath to remove dissolved ether, and is then ready for application of the colour reaction. Three cc. of acetic acid is added and about 0·05 gm. of chloranil and the mixture, contained in a test tube of 1·6 cm. diameter, heated for about 1·5 minutes in a free flame. If more than 1 part of plasmochin in 50,000 is present a blue or blue-green coloration appears. The solution is then cooled, left for some minutes to allow excess of chloranil to crystallize out, filtered and to the filtrate 1 to 1·5 cc. of ether is added. The ether remains in solution until the acetic acid is partially neutralized by the addition of a few drops of 50 per cent. caustic potash solution, when it separates as an intensely blue upper layer. Applied in this fashion 100 cc. of urine containing 1 in 2,000,000

of plasmochin gives an ethereal layer of bluish-green colour. The presence of quinine in the urine does not interfere with the test; normal urine free from plasmochin is coloured pink to bluish violet, but this colour does not pass into the ethereal layer, which in these circumstances remains pale yellow.

In one experiment in which 0·04 gm. of plasmochin was taken on each of three consecutive days, plasmochin was found in the morning urine (300 cc.) and in the day's urine (600 cc.), but none could be detected in the urine on the fourth or sixth day.

T. A. Henry.

Fabre (Henri). Comparateur à quatre tubes pour le dosage de la quinine dans les urines, à l'aide du reactif de Tanret et d'une solution titrée de quinine. [**Determination of Quinine in Urine.**]—*Bull. Soc. Path. Exot.* 1927. Dec. 14. Vol. 20. No. 10. pp. 972–973. With 1 chart. [Bact. Lab., Pointe-à-Pitre, Guadeloupe, W. Indies.]

Fabre points out that Robineau's calculations for the determination of the quinine content of urine by his four tubes [*ante*, p. 144] does not take account of the dilution of the fluid produced when many drops of quinine solution have to be added. He gives a curve showing the correct answers, which however, is printed so small as to be difficult to read.

C. L.

McNabb (Paul E.) & Stewart, Jr. (Thomas H.). **Experiences in the Quinine Prophylaxis of Malarial Infections in the Panama Canal Zone.**—*Amer. Jl. Trop. Med.* 1927. Nov. Vol. 7. No. 6. pp. 357–368. With 1 map & 1 chart in text. [2 refs.]

The " sanitated " area of the Panama Canal Zone is a narrow strip bordering part of the Canal and surrounding Panama and Colon and the larger towns. In 1926 three companies of engineers, each with a personnel of about 75, were engaged in mapping unsanitated, heavily malarious, regions. A daily ration of 15 gr. [1 gm.] of quinine was compulsory, was taken under supervision and, the writers are satisfied, was rarely missed. Of the 225 men, only 14 showed malaria during four and a half months in the jungle. During the following seven and a half months 92 further cases occurred, while in a control group of the same size only 8 cases appeared. The method of appearance of malaria constituted a veritable epidemic. In the first two weeks after ceasing quinine subtertian cases were numerous, reaching their peak in the second week and ceasing altogether after 5 weeks in all. Tertian infections were absent until after the second week and continued to develop during the whole period of observation. These facts are confirmatory of the conclusions that 15 grs. of quinine will not prevent malaria, but by suppressing symptoms and keeping men on their feet has a high military value in a malarious region.

C. L.

Panama Canal Zone. **Unprecedented Reduction in the Incidence of Malaria among Residents of Canal Zone Towns and the Cities of Colon and Panama.**—4 pp. With 1 fig.

Col. W. H. Chamberlain reports that the malaria rate in the Panama Canal Zone during 1927 was 10·7 per thousand among 13,560 employees,

there being 38 cases among 2,947 whites. Twenty-one of these certainly, and others probably, obtained their infections outside the "sanitated" towns. The per mille figures for 1905 were 514. The steady improvement since then "is believed to have resulted mainly from consistent extensions and improvements of the anti-mosquito drainage systems."

C. L.

Hewetson (W. M.). **Quinine in Obstetric Practice.** [Correspondence.] —*Brit. Med. Jl.* 1928 Jan. 28. p. 157.

Since instituting a regular daily dose of 2½ grains of quinine hydrochloride for six weeks, and of 5 grains for one week before the expected date of confinement, Hewetson (Rhodesia) has not been troubled by rises in temperature after confinement. The régime is insisted on, whether or not there is a history of malaria, and it is based on his experience that a large proportion of clinically typical malarias give negative microscopic results in the hands of experts, so that rises in temperature after confinement used to give him considerable anxiety.

C. L.

Urchs (Oswald). Drei Jahre Malaria-Kontrolle in Holländisch Guyana (1923–1926). [**Three Years' Malaria Control in Dutch Guiana.**]— *Abhandl. a. d. Gebiet d. Auslandskunde. Hamburg. Univ.* 1927. Vol. 26. (D., Med. & Vet. Vol. 2.) [Festschrift Nocht.] pp. 561–572. With 1 chart in text. [7 refs.] [Hosp., Surinam Bauxite Co., Moengo Mines, Dutch Guiana.]

The workers in bauxite mines in Dutch Guiana are partly imported Javanese, and partly local persons of mixed breed. The antimalarial measures carried out include the filling of two swamps, planting of papaya trees, general care of water, attention to housing inc uding the burning down of unsatisfactory huts, screening, and quinine administration. The effects are shown in a table dealing with the condition of the Javanese in 1923, and at the end of their contract period in 1926. The result of blood examinations in October 1923, May and October, 1924, and May 1925 gave these percentages of positives—adults 27·7, 11·6, 11·8, 10·1; children 58·6, 66·6, 70·3, 41·4. The Javanese suffered more severely than the natives. The infection index of the mosquitoes in 1921 was 15 per cent. and in 1922 5 per cent. as determined by Bonne, the species being *argyrotarsis, tarsimaculatus, mediopunctatus* and *pseudomaculipennis.*

C. L.

Ceylon. **Malaria Control in Ceylon.** Memorandum prepared by the Department of Medical and Sanitary Services, June, 1927.—6 pp. M/60/27.

A pamphlet giving particulars of the constitution and government, physical, climatic, and economic conditions, population and medical and sanitary services of Ceylon. Anti-malarial work done and precautions adopted are noted. There are two Boards for Malaria Control; one is the Anti-malaria Advisory Board, which receives, considers and advises on reports, and the other the Departmental Committee on Malaria, which initiates and controls the actual work through its executive officer, the Superintendent, Anti-malarial Campaign.

C. L.

Bose (Krishnasekhar). **Malaria Control at Birnagar 1927.**—*Calcutta Med. Jl.* 1927. Dec. Vol. 22. No. 6. pp. 285–327. With 1 map & 2 charts in text & 5 plates.

In 1856 this municipality had a population of 40,000, and acted in 1862 as the focus whence malaria spread to all Bengal. Its present population is 2,300 and it is, or was, one of those almost derelict lethargic towns which malaria has produced in parts of that province. In 1923 a local public health society was instituted, of which the author, a layman, is honorary secretary, devoting his Sundays and holidays to the work. This report deals with the year 1927, with references to earlier years [see *Bulletin of Hygiene*, Vol. 1, p. 568 ; Vol. 3, p. 586], is written in a sober spirit and makes a notable record. The whole area has been surveyed and the anopheles larvae found in each collection of water are known, thanks in the main to Mr. Iyengar, Entomologist, Malaria Research Laborarory, Calcutta. Similarly the good offices of Dr. C. A. Bentley, Director of Public Health, have secured large free gifts of quinine which has been distributed under good arrangements. The spleen index has fallen from the eighties to the low twenties. At the same time a beginning is being made in clearing the municipality of the jungle under which, for years, it has been drowned, and special terms have been obtained from the railway for the export of the felled trees as firewood. Annual expenses, collected locally, have risen to about Rs.4,000, the accounts being edited by the Government Circle Officer. The action of heavy rain here causes a muddy water with death of larvae, only newly hatched ones being found later when the water clears.

C. L.

Wehrle (W. O.). Praktische Erfahrung mit der Malariaprophylaxe in Monrovia (Liberia). [**Malaria Prophylaxis in Monrovia.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1928. Apr. Vol. 32. No. 4. pp. 194–197.

The writer refers to the daily use of quinine as a prophylactic on the West Coast of Africa, the doses employed being by French, 0·25 gm., English 0·324 gm. (5 grains) and German 0·4 gm. During the last 4 years he has had under observation on the average 70 to 100 Europeans. He is not in favour of this daily dose, but advises Ziemann's German method of 1 gm. on Sunday, and 1 gm. in the middle of the week ; or plasmochin 0·02 gm. daily or 0·06 gm. twice weekly ; or again, plasmochin compound with 0·02 gm. plasmochin and 0·25 gm. quinine daily or 0·05 gm. of plasmochin and 0·625 gm. quinine twice weekly. He has had no fever appear in plasmochin-taking cases, but reports no details, nor has he had any blackwater fever in Europeans during the last 4 years.

C. L.

Sfarčić. Malaria in Dalmatien und ihre Bekämpfung. [**Antimalarial Measures in Dalmatia.**]—*Abhandl. a. d. Gebiet d. Auslandskunde. Hamburg. Univ.* 1927. Vol. 26. (D., Med. & Vet. Vol. 2.) [Festschrift Nocht.] pp. 532–538. With 3 text figs. [2 refs.]

The immense amount of malarial work done in Dalmatia is mentioned. All three species of plasmodium are present in varying proportions, subtertian reaching as much as 66 per cent. The principal

antilarval work in this arid country lies in the " lokvas " but their supply of water to man and beast cannot be interfered with. The solution advocated is their enclosure and their connexion through a filter bed with a deep well. Gambusia is reported as having proved most effective and it is suggested that it will supplant other antimalarial measures.

C. L.

Woskressenski (B.) & Brenn (H.). Das Trockenlegen der Reisfelder für kurze Zeit als prophylaktisches Mittel im Kampf gegen die Malaria in Aserbeidshan. [**Malaria Prevention in Azerbaijan by Desiccation of Rice Fields.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1928. Jan. Vol. 32. No. 1. pp. 37–40.

The rice fields about Baku support in abundance *A. maculipennis* in summer, *A. pseudopictus* preponderating in August; *A. superpictus* and *A. bifurcatus* are also present. Their water contains sodium chloride in percentage of 0·001 to 0·006, has pH of 7·6 and the fields lie close to the houses in a densely populated country which lives by them. While it is pointed out that anopheles eggs will survive on moist earth for 5 days and that on the addition of water larvae will immediately hatch out, it is advised that irrigation should cease for 3 days in every 15. The spleen rate is 50 per cent. and anopheles larvae 3 to 22 per square metre.

C. L.

Fermi (Claudio). Sulla zooprofilassi antimalarica. [**Antimalarial Zooprophylaxis.**]—*Malariologia.* 1928. Jan. 31. Ser. 3. No. 1. pp. 6–9. With 2 text figs. [13 refs.]

In this paper are given for a number of villages the population of men and cattle, and the malarial morbidity. They may be summarized thus: number of human beings/number of cattle, percentage morbidity—125/1 and 10%; 19/1 and 12%; 18/1 and 10%; 13/1 and 5%; 10/1 and 15%; 5/1 and 60%; 4/1 and 2%; 2/1 and 66% to 80%; 1/1 and 100%; 1/2 and 100%; 1/3 and 100%; 1/10 and 65%; 1/21 and 100%. [Regarding zootropic deviation, if the figures show anything they suggest that the more cattle the more malaria.]

C. L.

South African Red Cross Society (Transvaal) & Union Department of Public Health. **First Measures in Malarial Prevention for Farmers and Settlers.** 2nd Revision. (Revised by G. G. Hay, with Chapter on Mosquito-Proof Housing by G. A. Park Ross).—36 pp. With 20 figs. In English and Dutch. Undated. S.A. Red Cross Society, Johannesburg. P.O. Box 3266. [356 (Health).]

The second revision of a practical pamphlet in English and Dutch, dealing with the causation, prevention and treatment of malaria. It is clearly written, but an advised *average* daily dose of 40 grains of quinine is perhaps likely to produce such obvious distaste for treatment that it may defeat its end.

C. L.

Sepulcri (Piero). La malaria all' Ongaro inferiore. Contributo di dettaglio alla conoscenza della malaria nel Veneto. (**Malaria in the Zone of the Lower Ongaro.**)—*Riv. di Malariologia.* 1927. Nov.–Dec. Vol. 6. No. 6. pp. 910–934. With 1 map in text. [English summary p. 1011.]

The English summary notes that results improved when quininization of patients was added to the use of Paris green and petroleum as larvicides and to the catching of adult mosquitoes.

C. L.

i. James (S. P.). **History of a Group of Anopheles Mosquitoes infected with *Plasmodium vivax* (Grassi & Feletti).**—*Abhandl. a. d. Gebiet d. Auslandskunde. Hamburg. Univ.* 1927. Vol. 26. (D., Med. & Vet. Vol. 2.) [Festschrift Nocht.] pp. 220–222. [1 ref.]

ii. ——, Nicol (W. D.) & Shute (P. G.). **Note on a New Procedure for Malaria Research.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1927. Nov. 25. Vol. 21. No. 3. pp. 233–236. With 1 chart in text. [2 refs.]

i. Six hundred female *A. maculipennis* were collected from a pigsty in England on August 23rd, 1926, some then containing blood. On August 24th and 7 following days, the batch was fed on a gametocyte carrier of *P. vivax*, being kept until September 6th at 23° C. in an incubator, whose air was as nearly saturated with moisture as possible ; and thereafter at room temperature (15° C. to 16° C.), in a cool chamber (13° C.), or in the ice chest (4° C. to 5° C.). As the mosquitoes died, some were dissected. Oöcyst infection in these reached 100 per cent. on September 7th and had disappeared by October 18th. Sporozoite infection in the dead reached 97 per cent. infection by September 14th, 100 per cent. by September 28th, remaining at this level till October 25th and then falling, till on November 23rd no sporozoites were found, while during the week before 7 patients bitten had failed to become infected. It was concluded that the batch was non-infective. On November 23rd, three months after the original infection, the 27 survivors of the batch were fed on a patient whose blood contained gametocytes who had earlier been infected by mosquitoes of the same batch. Oöcysts were present in specimens dissected on December 2nd and sporozoites in all specimens dissected after December 12th. Kept in the ice chest between applications, they infected patients on January 13th, 17th and 28th. On February 23rd one of two surviving specimens was killed, and contained a few oöcysts, and numerous sporozoites of normal appearance and activity in the salivary glands. The last survivor died on March 10th. In another experiment with seven mosquitoes of the same batch, mosquitoes fed on October 29th were at once transferred to the ice box and kept there continuously at a temperature between 3° C. and 6° C. for 44 days. Five were still alive. One was dissected and contained numerous sporozoites of normal appearance. Three of the four remaining mosquitoes bit a patient, who developed typical malaria 14 days later.

ii. This note describes a precise method for producing sporozoite infection. The salivary glands of one or more infected mosquitoes are dissected out in a drop or two of blood serum. If sporozoites are present the glands are squeezed through the cover and the expressed parasites washed out by adding more serum, 1 to 1·5 cc. sufficing to

recover them. This is taken up little by little during the washing into a hypodermic syringe and injected into a patient. It has been successful on all (five) occasions up to the time of report, incubation in four intravenous injections occupying 10, 12, 10 and 6 days and in one subcutaneous, 13 days. A further application of the principle was made by dissecting out the salivary glands of two infected mosquitoes in a 1 in 5,000 solution of quinine bisulphate, drawing 1 cc. of the solution containing many sporozoites into the syrnige, leaving for 15 minutes and injecting intravenously. The first acute attack, with *P. vivax* in the blood, followed 10 days later.

[This observation should shake the confidence of those who still hold that prophylactic quinine prevents infection. In conjunction with the methods used in the first paper it will permit of the application of much more exact and certain methods in the study of transmission of sporozoite infection.]

C. L.

RATCLIFFE (Herbert L.). **The Relation of *Plasmodium vivax* and *Plasmodium praecox* to the Red Blood Cells of their Respective Hosts as determined by Sections of Blood Cells.**—*Amer. Jl. Trop. Med.* 1927. Nov. Vol. 7. No. 6. pp. 383–388. With 36 text figs. [4 refs.] [School of Hygiene, Johns Hopkins Univ., Baltimore, Md.]

Ratcliffe mentions the conclusions of LAWSON, SINTON, and DE LANGEN that malaria parasites are extracorpuscular. On consideration he questions LAWSON because she studied smears, SINTON because in changing the tonicity of the solution he may have made parasites

Figs. 24 to 31 are camera lucida tracings of cross sections of human blood cells infected with *Plasmodium vivax*.
Figs. 32 to 36 are typical forms of *P. vivax* in blood cells from smears of the same case.
[Reproduced from the *American Journal of Tropical Medicine*.]

change their positions in the red corpuscles, and DE LANGEN because the parasites he saw floating freely in the hanging drop may have been gametocytes and because he could himself find, on repeating his experiment with canary blood and *P. praecox*, no decrease in asexual

forms in proportion to the total red corpuscle count. He has accordingly embedded and sectioned infected bird and human blood. The sections for the former were 2μ thick and for the latter 1·5μ. In no case has he found any parasite so placed as to be considered as extracellular or even as merely deeply imbedded in the corpuscle. His claim is supported by a number of camera lucida drawings taken from transverse sections only. They show the human corpuscle no longer a hollowed disc, and in all cases the erythrocytic tissue completely encloses the parasite. "The parasites have been found invariably to be intracellular."

C. L.

Thomson (J. G.). **Stippling of the Red Cells in Malaria.**—*Proc. Roy. Soc. Med.* 1928. Jan. Vol. 21. No. 3. pp. 464–467 (Sect. Trop. Dis. & Parasit. pp. 18–21). [18 refs.]

Thomson gives the history of Schüffner's dots in corpuscles harbouring *P. vivax* and of Stephens' and Christophers' dots and those of Maurer in those parasitized by *P. falciparum*. Prior to 1922 he had stained thousand of slides and never seen Stephens' and Christophers' dots till he went to Rhodesia, where they were a marked feature as was the altered colouration of the red corpuscles so affected. Is this stippling, it is asked, due to freak or special staining or is it found only at a definite stage in parasitic growth? It does not occur until the rings have reached a considerable size, 18 to 24 hours after the smallest rings have appeared. On the other hand, Thomson instances a class of over 70 using the same batch of films, the same stain and distilled water, with only 3 specimens showing the stippling and altered stain of red corpuscles. Until this staining reaction is understood, it is not possible to determine whether there is value in the suggestion that there is a separate *tenue* variety of the malignant parasite by which these dots are produced.

C. L.

Pastore (Salvatore). Le modificazioni morfologiche dei globuli rossi nelle diverse specie di infezione malarica. I granuli di Schüffner e le macchie di Maurer. [**Morphological Changes in the Red Cells in the Different Forms of Malaria.**]—*Policlinico.* Sez. Med. 1927. Nov. 1. Vol. 34. No. 11. pp. 541–556. With 12 coloured figs. on 1 plate. [8 refs.] [Anat. Path. Inst., Univ. Rome.]

Schüffner's dots are held not to be formed exclusively in cell parasitism with *P. vivax*, but to be found, though rarely, with *P. malariae*. They are believed to constitute a good basis of differentiation between *P. vivax* and *P. falciparum*. Maurer's dots, it is pointed out, have been reported from all three infections, although almost characteristic of subtertian malaria.

C. L.

Warasi (W.). Das Malariapigment und seine chemische Natur. [**The Chemical Nature of Malaria Pigment.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1927. Sept. Vol. 31. No. 9. pp. 428–431. [11 refs.] [Trop. Dis. Inst., Tiflis.]

Malaria pigment contains iron, but no sulphur or phosphorus. It is insoluble in water, alcohol, ether, chloroform, hydrochloric acid, nitric

acid, sulphuric acid, and caustic soda, and slightly soluble in acetic acid and " Saure Ather " Its percentage chemical analysis is carbon 51, hydrogen 7·6, nitrogen 13·5, oxygen 22·5 and iron 2·9, corresponding to an empirical formula of $C_{84}H_{152}N_{20}FeO_{82}$. It is thought probable that malaria pigment stands nearer to iron-containing melanin than to haematin.

C. L.

Romby (Paolo). I rilievi clinici e gli accertamenti di laboratorio nella lotta contro la malaria. [**Laboratory Diagnosis of Malaria.**]—*Sperimentale.* 1928. Mar. 17. Year 6. Vol. 82. No. 1–2. pp. 45–56. [11 refs.] [School of Military Hygiene, Florence.]

Romby advises as easy and distinctive the following monochrome staining procedure for plasmodia. Fix in alcohol containing 4 drops of picric acid and 4 drops of acetic acid in 30 cc. Immerse without agitation in [? equal parts of] a solution of 1 per cent. bicarbonate of soda and one made up as follows : Dissolve 0·6 gm. of methylene blue in 100 cc. of a 1 in 10000 solution of caustic potash. The rest of the paper follows ordinary lines.

C. L.

Hattori (R.). Studien über das Blutbild der Impfmalaria bei der progressiven Paralyse. [**The Blood Picture in Inoculation Malaria in G.P.**]—*Fukuoka-Ikwadaigaku-Zasshi.* (*Fukuoka Acta Med.*) 1928. Jan. Vol. 21. No. 1. German summary pp. 5–7. [In Japanese.]

In subcutaneously injected malaria an increase in polymorphs precedes the first attack and, as this begins, myelocytes may rise to 15 per cent. and plasma cells to 10 per cent. Eosinophils are lessened during incubation and may increase to an eosinophilia after a number of attacks. The percentages of lymphocytes, large mononuclears and intermediate forms are not altered. Convalescence is associated with a strong eosinophilia, and with a mononuclear increase. Numbers and colour of the red corpuscles begin to alter before the first attack.

C. L.

Piana (Giovanni Andrea). L'iperglicorachia importante elemento di diagnosi nelle sindromi perniciosanti malariche dell' infanzia. [**Hyperglycorrhachia in the Diagnosis of Pernicious Malaria in Childhood.**]—*Pediatria.* 1928. Jan. 1. Vol. 36. No. 1. pp. 24–38. [21 refs.] [Inst. of Clin. Pediatrics, R. Univ. Sassari.]

Piana has examined the sugar content of blood and spinal fluid of 20 children varying in age from 6 weeks to 7 years. Twelve were ordinary cases of malaria and 8 were classed as pernicious ; that is to say " meningeal " symptoms were present. In the normal cases the sugar content of the blood, apparently estimated in 3 only, lay between 1·45 and 1·56 per cent. In 10 of these normal cases the spinal fluid content lay between 0·7 and 0·9, in one it was 1·17 and in the

twelfth 6·8. In the pernicious cases the sugar content of the blood was, in the 4 in which it is stated, 1·97, 2·87, 4 and 4 while that of the spinal fluid lay between 1·35 and 1·81 in six, was 2 in one and 3 in the eighth case. There is in general a sharp increase of these contents in the grave cases.

C. L.

KIKUTH (Walter) & TROPP (Gaspar). Studien ueber Vogelmalaria. [**Bird Malaria Studies.**]—*Abhandl. a. d. Gebiet d. Auslandskunde. Hamburg. Univ.* 1927. Vol. 26. (D., Med. & Vet. Vol.. 2.) [Festschrift NOCHT.] pp. 236–245. [16 refs.] [Inst. for Ship & Trop. Diseases, Hamburg.]

Reinfection in 27 canaries, which had been infected 4 weeks to 5 months earlier, failed while controls became infected. Of 37 infected canaries, kept under observation for 4 months, spontaneous relapse occurred in 67·5 per cent.—in March 4 cases, in April 8, in May 15 and in June 8. In one case parasites were found for 9 days ; usually they appeared for one day only. Artificial relapse was induced, by injection of 0·06 gm. of adrenalin, in all but 3 of 19 birds. In birds receiving adrenalin, quinine does not cure ; they eventually die. Birds' faeces always contain blood to the spectroscope but not to the guaiacum method. Where this latter test was applied to the faeces toluylendiamin administration gave a positive reaction ; quinine methylene blue, myosalvarsan and plasmochin a negative one.

C. L.

KENYA & EAST AFRICAN MEDICAL JOURNAL. 1927. Sept. Vol 4. No. 6. pp. 185–188.—**Simple Notes on Some Tropical Diseases. A Popular Account of the Commoner Diseases of East Africa, with Hints on General Lines of Treatment, for the Use of those out of Reach of Immediate Medical Assistance. No. 1. Malaria.**

The first of a series of papers giving hints for laymen, isolated from medical aid, on the commoner diseases of East Africa. It is just what is needed from its beginning to the final words, "Because we have ventured to offer advice on the treatment of simple cases of malaria, it by no means follows that the disease in its malignant form can ever be left to the sole care of unqualified persons."

C. L.

MONTELEONE (Remo). L'insufficienza respiratoria nella malaria acuta e cronica. [**Respiratory Insufficiency in Acute and Chronic Malaria.**]—*Policlinico.* Sez. Med. 1927. Nov. 1. Vol. 34. No. 11. pp. 557–564. With 4 graphs. [5 refs.] [Inst. of Clin. Med., Univ. Rome.]

Monteleone finds that during acute malarial attacks with rise in temperature there is a diminution in the respiratory or vital capacity. It is attributed not only to increased volume of liver and spleen but also possibly to a subdiaphragmatic hepatitis and splenitis.

C. L.

Bentmann (E.). Gibt es noch autochthone Malaria im Rheintal? [**Is Malaria still Indigenous in the Rhine Valley ?**]—*Abhandl. a. d. Gebiet d. Auslandskunde. Hamburg Univ.* 1927. Vol. 26. (D., Med. & Vet. Vol. 2.) [Festschrift Nocht.] pp. 25–36. [12 refs.]

The writer cannot agree that there is a focus of endemic malaria in the Rhine Valley. There have been sporadic cases since it was introduced there in 1915 by Russian and Roumanian prisoners, but the prevalence of anopheles is not such as to spread it widely.

C. L.

Gougerot. Malaria spontanée prèventive impuissante et malariathèrapie " guérissant " une P.G.P. [**Natural Malaria not Preventive. Malaria Therapy "cures" General Paralysis.**]—*Bull. Soc. Française de Dermat. et Syph.* 1927. Nov. No. 8. pp. 715–717.

A man who had acquired syphilis 11 years earlier and had had malaria for 2 or 3 years of that time developed general paralysis. Malaria was transmitted to him and he had 11 attacks of high fever during 30 days with rapid mental improvement.

C. L.

Lee (C. U.) & Meleney (H. E.). **Malaria in a Village near Peking.**—*China Med. Jl.* 1927. Dec. Vol. 41. No. 12. pp. 989–992. With 1 chart.

In the village Ch'engfu near Peking the spleen rate under 10 was 13·8 and from 11 to 15 was 7·4. Examination was made with the child lying on the right side with the knees drawn up. Malaria begins to increase sharply during May, the first anopheles being found in June.

C. L.

La Face (L.) & Sella (M.). La zooprofilassi nella lotta antimalarica secondo le concezioni di B. Grassi. (**Zooprophylaxis in Malaria Control according to Prof. B. Grassi's Opinion.**)—*Riv. di Malariologia.* 1927. Nov.–Dec. Vol. 6. No. 6. pp. 935–943. [2 refs.] [English summary pp. 1011–1012.]

The writers claim that Grassi " was the first to observe the relation between anopheles and domestic animals." Aggregation of anopheles in stables he attributed at first to thermotropism. Later he called in misanthropic races and varying feeding instincts. He never refused to acknowledge the value of zooprophylaxis, but considered a practical solution difficult.

C. L.

de Mello (Froilano) & Vernencar (H. P.). Nouvelles études sur les résultats de la *Smalarina Cremonese.* [**Fresh Studies of Smalarina Treatment.**]—*Bull. Soc. Path. Exot.* 1927. Dec. 14. Vol. 20. No. 10. pp. 966–972.

Another report that smalarina is quite useless in malaria.

C. L.

Gasasianz (A. A.). Schwankungen des amyloklastischen Vermögens des Urins und des Speichels bei Malariakranken. [**Variations of the Amylolytic Property of the Urine and Saliva in Malaria.**]—*Russian Jl. Trop. Med.* 1927. Vol. 5. No. 10. French summary p. 675. [In Russian pp. 624–625. 3 refs.]

Quinine increases the excretion of urine and of amylase andthe secretion of amylolytic ferment in the saliva.

C. L.

Neviadomsky (M. M.). Sur le diagnostic du paludisme chronique. [**Diagnosis of Chronic Malaria.**]—*Russian Jl. Trop. Med.* 1927. Vol. 5. No. 9. French summary p. 603. [In Russian pp. 538–542.]

In experience with 795 cases it is concluded that chronic malaria may be febrile, normal, or subnormal. In 30 per cent. it is latent, and splenomegaly is often the only symptom. X-rays show that the spleen is denser than normal, discloses latent forms, and should more frequently be employed.

C. L.

Plehn (A.). Die Förderung der Malariaforschung durch die moderne Therapie der Metalues. [**The Modern Treatment of Parasyphilis as furthering Malaria Research.**]—*Abhandl. a. d. Gebiet d. Auslandskunde. Hamburg. Univ.* 1927. Vol. 26. (D., Med. & Vet. Vol. 2.) [Festschrift Nocht.] pp. 409–437. [84 refs.]

A summary of recent work with a useful bibliography.

C. L.

Castagna (Pietrino). L'arsenicoterapia ad alte dosi nella cura dei postumi d'infezione malarica e di forme infettive in genere.—*Gaz. d. Ospedali e d. Clin.* 1927. Aug. 28. Vol. 48. No. 35. pp. 821–826. [29 refs.]

Chatterjee (N.). A Case of Malignant Malaria.—*Indian Med. Gaz.* 1928. Jan. Vol. 63. No. 1. pp. 20–21.

Falcão (Theophilo). Em torno de um caso de nevralgia facial de origem palustre.—*Brasil-Medico.* 1927. Nov. 19. Vol. 41. No. 47. p. 1233.

Fermi (Claudio). Il risorgimento agricolo, industriale e demografico della Sardegna e la malaria.—*Malariologica.* 1928. Jan. 31. Ser. 3. No. 1. pp. 3–6. [1 ref.]

Gupta (C. C. Das). Dysphagia as a Complication of Malaria.—*Indian Med. Gaz.* 1928. Jan. Vol. 63. No. 1. pp. 21–22.

Leger (Marcel). Le paludisme dans ses rapports avec les *Plasmodium* des animaux.—*Rev. Prat. Malad. des Pays Chauds.* 1927. Nov. Year 6. Vol. 7. No. 11. pp. 589–592.

Li (K. H.). What a Mission Hospital can contribute to the Study of Malaria.—*China Med. Jl.* 1927. Nov. Vol. 41. No. 11. pp. 931–935.

Moschkowski (Sch.). Ueber zweckmässige Chininbehandlung der Malaria.—*Arch. f. Schiffs- u. Trop.-Hyg.* 1927. Dec. Vol. 31. No. 12. pp. 589–593. [10 refs.] [Trop. Inst., Moscow.]

Mukerji (S. B.). Cases of Malaria in a Family.—*Indian Med. Gaz.* 1928. Jan. Vol. 63. No. 1. pp. 18–19.

Ovazza (V. E.). L'indice splenico dei malarici.—*Malariologia.* 1928. Jan. 31. Ser. 3. No. 1. pp. 10–11.

Risacher (S.). Paludisme et puerpéralité.—*Rev. Prat. Malad. des Pays Chauds.* 1927. Sept. Year 6. Vol. 7. No. 9. pp. 465–481. [15 refs.]

Risquez (Francisco A.). El pigmento melánico en el paludismo.—*Abhandl. a. d. Gebiet d. Auslandskunde. Hamburg. Univ.* 1927. Vol. 26. (D., Med. & Vet. Vol. 2.) [Festschrift Nocht.] pp. 461–463. [3 refs.]

Sirca (Antonio). L'applicazione della sinforeazione all'indagine dello stato di alcuni organi bella malaria nell'età infantile.—*Pediatria.* 1928. Feb. 1. Vol. 36. No. 3. pp. 135–142. [19 refs.] [Inst. of Clin. Pediatrics, R. Univ., Sassari.]

Werner (H.). Zur Fieberbehandlung der Paralyse (Malaria- und Quintanaimpfung).—*Abhandl. a. d. Gebiet d. Auslandskunde. Hamburg. Univ.* 1927. Vol. 26. (D., Med. & Vet. Vol. 2.) [Festschrift Nocht.] pp. 590–593. [1 ref.]

HISTORICAL (CORRESPONDENCE).

WINTER (Francis A.). **The Romantic Side of the Conquest of Yellow Fever.**—*Milit. Surgeon.* 1927. Oct. Vol. 61. No. 4. pp. 438–452.

" On page 172 of the *Bulletin* for March, 1928, is a review signed by J. F. C. H. on an article by WINTER on yellow fever. In this article the reviewer asks two questions in next to the last paragraph. Why did the disease disappear (from British Guiana)? Why did it not disappear from Cuba?

" The full answer to these questions will be found in an article by Surgeon-General Henry Rose Carter, published in the *Transactions of the Society of Tropical Medicine and Hygiene*, June, 1917, volume 10, No. 7. Although it is almost eleven years since the publication of this article, everything that has been found in yellow fever campaigns and yellow fever studies has confirmed the truth of the statements made by Dr. Carter in this article. The discussion is interesting after this long interval. The doubts expressed in the discussion have not been justified by what has happened in the interval. Those of us who have been close to the yellow fever work feel that the paper of Dr. Carter gives an adequate answer to the questions of the reviewer.

" In the last paragraph the reviewer makes a statement that, ' the conquest of yellow fever can never be complete until the causal organism has been identified with certainty.' A little study of the disappearance of yellow fever from North America, and its almost complete disappearance from South America, would seem to throw great doubt upon the value of this statement. On the other hand, experience has shown everywhere where it has been tried on an adequate scale, and under suitable supervision, that yellow fever can be eradicated by control of the vector, and that knowledge as to the causal organism is merely of academic interest."

H. H. Russell.

Director of the International Health Division, The Rockefeller Foundation, New York.

April 26, 1928.

Dr. Russell says that the questions at issue were fully answered by CARTER. CARTER himself, in the paper referred to, said on this very point : " the explanation given above is believed to be true . . . Yet it is but a deduction from a fact and not the fact itself ; " a statement as true to-day as it was eleven years ago. CARTER admitted that his explanation " depends absolutely on the doctrine that an attack of yellow fever confers immunity against another attack." He should have added that it assumes the truth of another unestablished " doctrine " namely that all who reach adult life in a yellow fever endemic area, are not only immune to the disease, but cannot harbour the causal organism and that they attain this condition whether they apparently contract the disease or not. This point was made by JAMES in the discussion following CARTER's paper and, so far as I am aware, has never been disposed of.

In writing that the conquest of yellow fever will never be completed until the causal organism has been discovered I had in mind completion of the search for knowledge upon which REED and his co-workers embarked rather than the more limited conception of disappearance of the disease. I cannot think, however, that these writers would have regarded their task as complete so soon as they had placed an effective tool in the sanitarian's hand, or that they would have shared Dr. Russell's view that " knowledge as to the causal organism is merely of academic interest."

Such knowledge and more is vital for the establishment of CARTER's views as something better than a doctrine On the side of practical

prevention, NOGUCHI in 1922 (*Lancet*, 1922, Vol. 1, p. 1185) and others down to SELLARDS in 1928 (*Bull. Soc. Path. Exot.*, 1928, Vol. 21, No. 1 p. 70) have pointed to the value which, under conditions not favourable to attack on the vector, would attach to the possession of a prophylactic vaccine. Recently too (*Bull. Acad. Méd.*, Paris, 1927, Nov. 22, Year 91, 3rd ser., v. 98, No. 38, p. 434) the French Colonial Secretary addressed to the Academy of Medicine an official enquiry as to the value or otherwise of NOGUCHI's icteroides vaccine. The answer was no credit to the profession of medicine. The results of recent research on the aetiology of yellow fever are of course inconvenient and disturbing to those who have publicly proclaimed their confidence in the specific efficacy of *Leptospira icteroides* vaccines and sera, but there is no escape from the dilemma by writing it off as " merely of academic interest."

Already since the publication of WINTER's paper, there is accumulating material for a further chapter of the romance of the conquest of yellow fever; let us hope that chapter may record the completion of the conquest.

J. F. C. H.

MACARTHUR. **Old-Time Typhus in Britain.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1927. Apr. 27. Vol. 20. No. 8. pp. 487–503. With 2 figs. on plates. Also in *Jl. Roy. Army Med. Corps.* 1927. June. Vol. 48. No. 6. pp. 401–418. With 2 text figs.

" In his graceful and, otherwise, most laudatory review of my address on Old-time Typhus (ante, p. 180), Colonel ALCOCK makes some criticisms which I feel cannot pass unchallenged lest my late audience should condemn me as a purblind and irresponsible guide.

" I was quite aware that in Shakespeare's day the word ' ague ' usually stood for malaria ; my point was that, in addition, its original meaning of fever (including typhus) still persisted, and that the word appears in this sense in *Macbeth*. The ancient signification of ' ague ' survived in England even beyond Shakespeare's time, for John Chamberlain writing of the typhus epidemic of 1623, calls it indifferently ' the spotted fever ' and ' the spotted ague.' So as to refute my assertion regarding the original meaning of the word, Colonel ALCOCK cites Bede's *Ecclesiastical History*, where, he says, ' ague ' is applied to a malady shown by the description to have been malaria. I agree with this identification of the ailment, but the word ' ague ' does not occur in the original text. Bede's actual words are : *' puerulus quidam longo* febrium *incommodo graviter vexatus,'* etc. The Anglo-Saxon version has : *' in longre* lenctenadle *hefiglice swenced,'* etc. ' Ague ' is found only in the modern English translations of the *Ecclesiastical History* where, naturally, the word is used in its present-day sense ; both the Latin and Anglo-Saxon texts were translated into English by the same scholar, and so, no doubt, ' *lenctenadl* "* in one text suggested ' ague ' as an appropriate term for ' *febris* ' in the other.

" Colonel ALCOCK also takes me to task for rendering *drif* (*Anglo-Saxon Chronicle*, 1087) by ' fever,' and quotes Ingram's English version of the *Chronicle*, published over a century ago, where *drif* is translated ' diarrhoea.' I do not know what reasons Ingram may have had for this belief which is rejected by more recent translators, e.g., Thorpe in the official *Chronicles and Memorials* series. Further, neither Bosworth nor Clark Hall accepts Ingram's interpretation, and in their dictionaries both define *drif* as ' fever,' the former citing this very passage from the *A.S. Chronicle* as an example of the use of the word. But infinitely more weighty than the opinion of any number of modern scholars is the silent

* It is interesting that King Alfred (the translator of Bede's Latin text into Anglo-Saxon) was so familiar with malaria as to recognize the disease from Bede's description, and render *febris*, not by an exact Anglo-Saxon equivalent, but by *lenctenadl*, Spring (Lent) ill, that is, malaria.

testimony of the Rushworth Codex. This is an ancient Latin M.S. of the Gospels wherein some old English scribe interlineated a word-for-word Anglo-Saxon translation. Here in more than one instance '*febris*' is glossed by '*drif*,' but one example will suffice. The first sentence of Matt. VIII, 15, runs

7	æthrán	honda	his	7	forlet	hiae	sio†drif
Et	*tetigit*	*manum*	*ejvs*	*et*	*dimisit*	*eam*	*febris.*

This seems to leave no doubt what *drif* meant to those who spoke this 'language that has long gone by.'"

W. P. MacArthur.

In reviewing Colonel MacArthur's paper on Old Time Typhus in Britain I dissented (1) from the argument that the word "ague" in its olden usage must be interpreted as the equivalent of the Greek word "synochus"—σύνοχος being, according to Liddell and Scott, a *restrictive* term for *un*intermittent fevers, originated by Galen; and (2) from the assumption that all the unspecified pestilences definitely associated with the famines of early periods of English history were typhus; and I supported my criticism by what, as I then supposed, were two interesting and easily verifiable references to the earliest of all English historical documents—namely, the Venerable Bede's *Ecclesiastical History of the English Nation*, and *The Anglo-Saxon Chronicle*—where, in the one case, an account of an intermittent fever is called "ague," and, in the other case, a particular famine-bred pestilence is called "diarrhoea." I know the two ancient documents only in their modern English versions, and it is from the well-known "Everyman" editions that my quotations were taken. Colonel MacArthur, however, has shown from his knowledge of original texts that in the one instance (ague) the translation in question, although justifiable, is not verbally correct, and that in the other instance (diarrhoea) the translation in question is generally contradicted. I must, therefore, while reserving my freedom in the larger precincts of opinion, withdraw my untrustworthy witnesses from the court, and apologize for having introduced them without examining their credentials.

A. Alcock.

† "Sio"=seó, i.e., "the."

REVIEWS AND NOTICES.

KNOWLES (Robert) [Major, Indian Medical Service, Professor of Protozoology, Calcutta School of Tropical Medicine] & SENIOR-WHITE (Ronald) [Malaria Research Officer, Central Malaria Bureau Govt. of India.] **Malaria. Its Investigation and Control with Special Reference to Indian Conditions.**—pp. vi.+220. With 42 figs. & 6 plates (5 coloured) & 29 figs. in Appendices II & III. 1927. Calcutta: Thacker, Spink & Co. [Rs. 7-8.]

This book is intended to meet the malaria problems of men of the Assistant-Surgeon class and this it does well. A clear description is given of the three species of *Plasmodium* which parasitize man, illustrated by three coloured plates. A striking incident shows the frequency of mixed infections, a neglected point which has led to tragedy when inadequate care has been taken to exclude the subtertian parasite from malarial blood which is to be used for the therapeutic infection of general paralytics. The share which this line of treatment has had in establishing the specific differences between the three ordinary species of plasmodia is brought out. Mention too is made of exceptional forms: of *P. ovale*, a synonym, if it be a valid species, of *P. minutum*,* and of *P. tenue*, of whose right to a separate specific existence Knowles is unconvinced.

A short survey is given of Ronald Ross's malarial work onwards from 1895, when, as a military medical officer keen on research he must have appeared to his regimental fellows of those days as a "somewhat unpleasant phenomenon." An apt diagram illustrates the interlinked human and anopheline cycles. The reasons against "parthenogenesis" are put clearly and reasonably, but unhappily all are not open to reason. On the question of malaria toxins different pages do not necessarily speak with the same voice. The plasmodia of animals other than man are illustrated after WENYON, to whom here and elsewhere full acknowledgment is given. The chapter on practical work is valuable, and pleasurable, too, if you can manage to skip the three consecutive lines with their two split infinitives. It is in every sense practical, deals among other matters with the preparation and examination of films, describes the normal and abnormal blood cells and depicts them in a coloured plate.

In treatment, SINTON's method is advocated for oral administration. Intramuscular quinine receives complete lack of sympathy, and the pertinent question is virtually asked—"If you must use a needle, why not put it into a vein?" There is much else of a practical nature here, such as the determining of the strength of the hospital stock quinine mixture which the compounder is so curiously apt to make up considerably under proof.

Senior-White's equally practical hygiene chapters follow. He notes for example that an epidemic of malaria is invariably associated with an increase in deaths from bowel complaints, yet CHRISTOPHERS has shown that the percentage of error is constant, so that the village chowkidar's statistics really are valuable after all in mortality registration. They are to be checked by hospital records, and by spleen and parasite indices. CHRISTOPHERS's abdominal charts for measuring splenic enlargement are described; as well as McKENDRICK's mathematical differentiation of relapse from reinfection, for the comprehension of which, however, "very high mathematical acquirements are required." Determination of the dominant species of malaria parasite and of the distribution of anopheles need a year's observation, and, when the peccant species have been determined, species control is urged. That

* See WENYON's "Protozoology," (1926), vol. 2, p. 949.

introduces the question of breeding-place deviation, and the control of maddeningly arising see pages after completion of a surface drainage scheme.

Appendices deal with the breeding-places and distribution of Indian anopheles and supply keys to their adult and " mature " larval forms ; and so we come back full circle to the beginning of the book and surely lay bare twin hidden domestic tragedies : " Dedicated with respectful homage to the wives of research workers (in recognition of their sufferings in the cause of science)."

Clayton Lane.

Association of Medical Officers of Missionary Societies. **Health Instructions for Missionaries in the Tropics. With a Section on Emergency Treatment and a Supplement for Women Missionaries.** Fourth Edition.—32 pp. With 3 figs. 1928. London : Hon. Sec., 1, Farnley Road, E. 4. [4d. ; 3s. per doz.]

There is nothing novel about this little book, but it contains much sound advice for missionaries. If its rules are followed much avoidable sickness in the tropics will be escaped. There is sensible emphasis on the need for holidays away from tropical climate and the round of missionary work ; one hopes that this advice, as well as being addressed to the missionaries themselves, has been pressed upon the authorities of missionary societies.

For diarrhoea the main part of the booklet recommends half an ounce to an ounce of castor oil ; in the section for women missionaries Dame Mary Scharlieb advises a teaspoonful !

Protective inoculation against enteric infection is recommended for infants as soon as they begin to crawl, an obviously rational thing where such diseases are endemic ; it has sometimes (unnecessarily) been thought that the vaccination must be delayed until the child reaches 7 years of age. It must be remembered, however, that there is experimental evidence that it is less easy, by means of vaccines, to produce immunity in the very young than in adults.

A useful list of helpful books is given and an ABC of health.

J. F. C. H.

Documents cliniques sur le stovarsol 1922–1927. [**Scientific Papers on Stovarsol 1922-27.**]—pp. xii + 318. Paris : Les Etablissements Poulenc Frères, 86–92, Rue Vieille-du-Temple.

This is a useful work in that it contains within one cover a large number of articles relating to the use of stovarsol. Ehrlich concluded from his researches that trivalent arsenic alone was active against protozoa. Fourneau later showed that this was not the case ; pentavalent compounds were equally active and, moreover, were less toxic than trivalent. Stovarsol is pentavalent and has also the merit that it can be taken by the mouth. The present work contains, chiefly in abstract, 11 papers on the use of stovarsol in syphilis, 9 in yaws, 2 in relapsing fever, 4 in intestinal protozoal affections, 18 in amoebiasis, 4 in lambliasis, 3 in associated " parasitoses," 2 in intestinal spirochaetoses, 6 in fuso-spirillary associations, 7 in malaria, 2 in trypanosomiasis ; from which it is evident that the drug is not narrowly specific, but has a wide range of action. Many of these papers have been noticed in the *Bulletin*. The list of references, from 1921 onwards, occupies 24 pages.

A. G. B.